STUDY TO EVALUATE THE FACTORS AFFECTING DELAYED DISCHARGE/ TRANSFER OF PATIENTS FROM THE EMERGENCY ROOM AND ITS IMPACT ON PATIENT VOLUME.

by

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DEDICATION

Project is devoted to the healthcare industry and the general population to highlight the importance of emergency departments and emergency situations. It aims to evaluate the factors causing delays for patients regarding bed availability, discharge to home, or transfer to the ward and ICU.

"WORK TODAY TO SECURE TOMORROW FOR BETTER FACILITIES"

ACKNOWLEDGEMENTS

When I began this project, many people entered my life, offering advice, while some provided discouragement. However, few stayed with me throughout my journey.

I want to convey my heartfelt acknowledgment to my mentor, Prof. Atul Pati Tripathi, invaluable assistance in generating new ideas, providing insights, and offering his expertise, which was crucial for the completion of this research. He consistently encouraged me to complete my research on time, and his commendable contributions elevated the point of my work.

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ABSTRACT

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MS. VIKAS DAHIYA

2025

Dissertation Chair: <Chair's Name>

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A study is being conducted to evaluate the various elements affecting the delayed discharges/transfers of patients from the emergency room to either ward or home, as well as their effect on patient turnover in the emergency room.

Increased patient wait time in the emergency room of a hospital is a worldwide challenge. Staying in the emergency room for more than 12-15 hours increases mortality and morbidity rates, health care costs, and patient satisfaction. The emergency department becomes overcrowded, which leads to prolonged patient stays, which in turn is associated with several problems in patient care.

Aim—The aim is to find out the reasons for delays and stay of patient and time to wait getting treatment in the emergency room in the department, treatment, and discharge of the inpatient to home or ward/ICU.

The goal of the study is to create a strategy that is going to resolve the factors of area delay in the emergency department. So as to decrease the cost, improve patient satisfaction, and quick decision making for the doctors.

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CHAPTER I:

INTRODUCTION

Introduction will presents comprehensive summary, a study within the healthcare domain, and help to understand the various elements that act on the patient's waiting time in the emergency room. It will also look for appropriate interventions in this area, which might help improve the economics of the hospital in terms of average revenue per occupied bed in the emergency room. It will also assess the outcome of the volume of suffering patients in an urgent situation in an emergency room. This study will help us explain the significance, provide the research outcomes, and demonstrate the reasoning and logic for conducting this study

1.1 Introduction

The Emergency Room (ER) is a hospital's most congested, time-sensitive, and emotionally charged area. The management of the patient flow in the ER depends upon a variety of factors with sequentially timed segments, which, if appropriately managed, can result in reduced waiting time and better patient experience. Across the world, waiting time in an emergency is a concern for patients to enhance their comfort during their ER stay and for hospitals in terms of their volumes by improving the management of patients' turnover time.

Different studies have reported variable average ER waiting periods for patients, and the impact of the individual components of this waiting time on the final volumes of patients leaving or being transferred from the emergency room is not standardized. No studies from India, particularly in the private sector, have addressed this issue.

Understanding the various factors which affect the long time spent by patient in the emergency room and appropriate interventions in this evaluated area might positively impact patient volumes and hospital economics regarding the Average Revenue Per Occupied Bed (ARPOB) in the emergency room.

Management of patients from the ER is dependent upon various factors. It is practically impossible to compare different sectors of healthcare in this aspect. The government-managed health sector is completely different from private healthcare facilities. The ERs of underdeveloped countries have vast differences in terms of infrastructure, waiting time, and management protocols compared to those of developed countries.

India is an evolving health hub. The annual turnover of the healthcare occupation in India approximately 300 billion. The national capital region of India, particularly Gurgaon, is the destination for all people seeking tertiary/ quaternary health care in health care. The corporate sector in Gurgaon contributes a good amount to the total healthcare market. Patients who are ready to take the economic burden of this level of healthcare on their shoulders need a quality experience and value for their money. A shorter waiting time in the ER is likely to be associated with a better patient experience.

The Routine Process of Emergency

Depending upon the patient's condition, the patient or the attendants present in the emergency room are either immediately transferred to the ER bed or asked to register in the emergency room.

The emergency doctor assesses the patient gives first aid, and maintains the airway, breathing, and circulation (ABC of emergency management); any immediate intervention, if needed, is delivered to the patient there and then, and those investigations that are important

and life-saving measures are sent. Based on the initial assessment by the ER doctor, the patient is either discharged home after the first aid or the case is escalated to the concerned specialty team or super specialty team. The various time-sensitive segments between the presentation of the patient to the emergency and being first attended by the doctor are the waiting time before getting transferred to the bed, the waiting time at the registration counter, waiting time of ER doctor to attend the patient, the time taken by the assessment of ER doctor, investigation ordered, the first intervention, and the time taken for the patient to be shifted out for discharge if need be. Once the specialty doctor is contacted, he comes over and evaluates the patient, orders, specialized investigations, and some basic treatments, and asks the ER doctor to review once the investigations are done. The time segments involved in this aspect of the patient are staying in hospital emergency is the time between the review of the doctor and call made to the specialty doctor, the time between the call attended and visit of the specialty doctor, the time taken between the evaluation and ordering of the investigation, and the time taken for the investigation to be done and interim reports being generated.

Thereafter, a review is call made by the ER staff to the specialty doctor for a final review of the patient. Here the time taken by the ER doctor to contact the specialty doctor and by the specialty doctor to review the patient with the reports are important factors.

The final step is the decision made by the specialty doctor for the patient. The patient may be discharged home or sent to a ward or ICU. The time-sensitive segment here are the time taken for the patient to be transferred out or sent home if not discharged, then the management has to look for available beds at ICU / wards, and the availability of staff to cater the physical transfer to the patient's final destination.

We can divide the patient's entire stay in the emergency into the following heads.

• Presentation in the ER to bed allotment and registration.

• Time taken between allotment of bed to first review by the ER doctor.

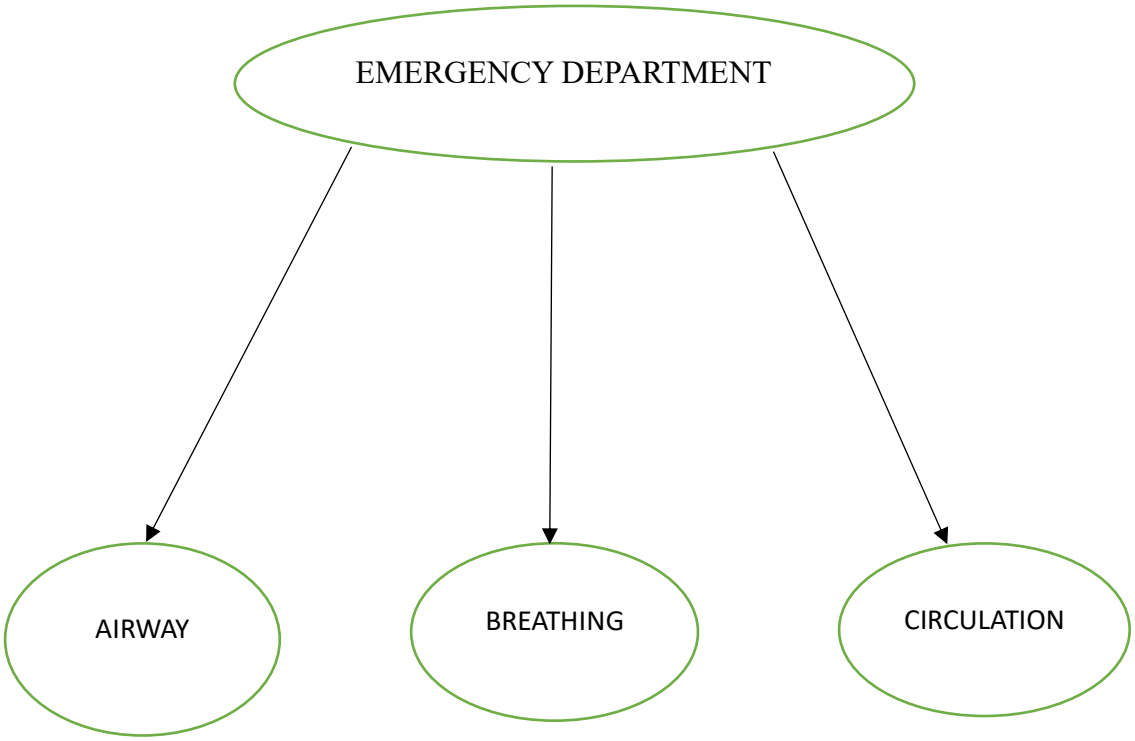
• If the patient is discharged after the first review - time taken between the decision and the actual vacation of the allotted bed of the patient.

• If the patient stays in the time taken specialty doctor to first review of the patient.

• The time taken between the first review and the completion of the relevant investigation.

• Time taken after the completion of the investigation and final review by the specialty doctor and, finally, time taken after the decision of the specialty doctor to create a bed vacancy in the ER.

Figure 1: ABC of Emergency Department



1.2 Research Background and Scope

An increasing number of cases in the emergency room results in longer patient stays, which, in turn, is correlated with several problems in the supervision of the patients (1). The average time of waiting in the emergency premises has been examined in different studies, and the impact of the individual factors of this waiting time on the final volumes of the patients leaving or being transferred from the emergency department has not been evaluated in depth and is not standardized. This study will help to know the various points that impact the time of wait of the patients in the ER and define interventions needed that would help and have a constructive impact on the volume of the cases in the ER. This would, in turn, help to boost the economics of the hospital in terms of average revenue per occupied bed in the emergency room and would reduce patient costs and increase satisfaction.

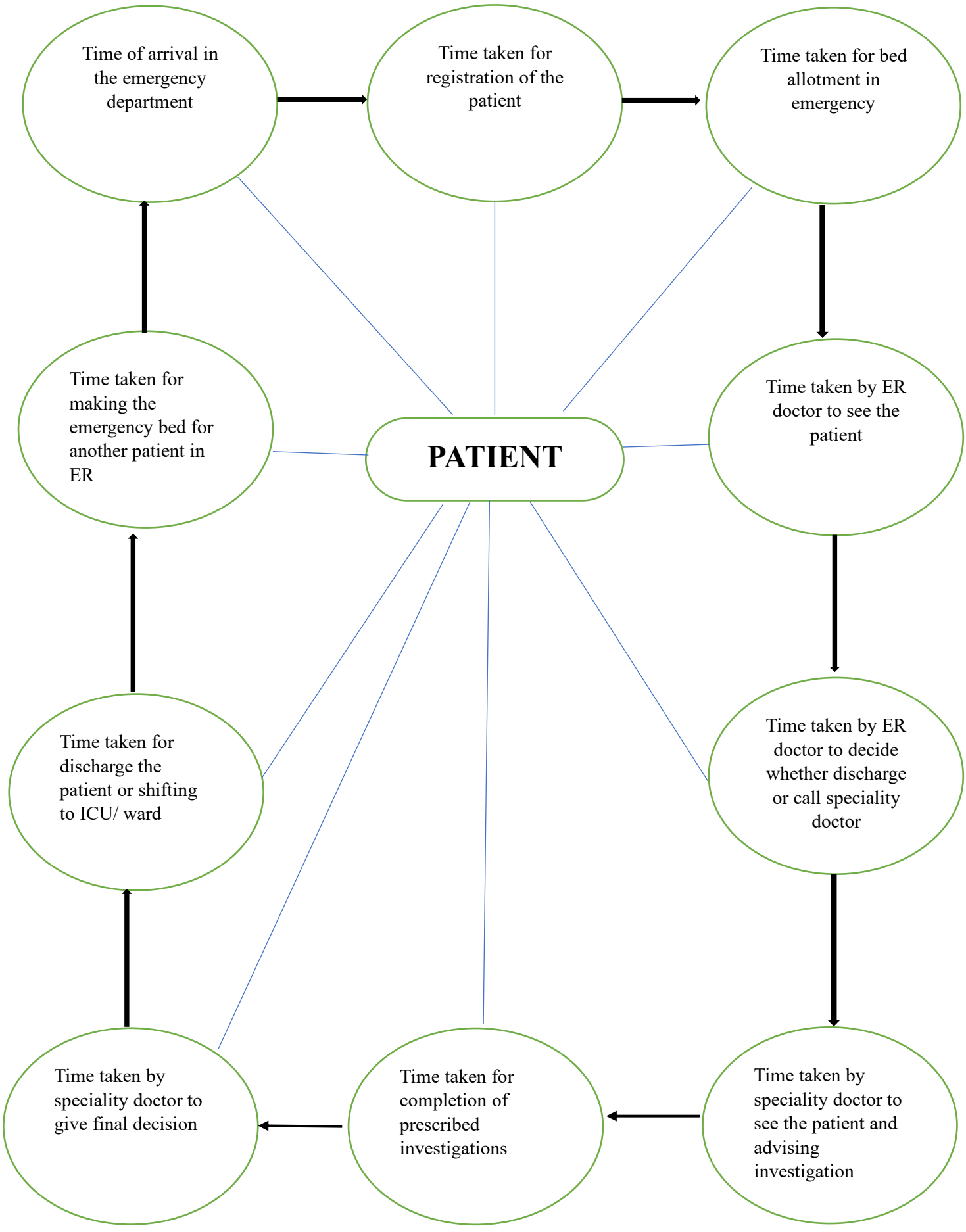
In this observational study, patients will be evaluated in the hospital of emergency of a high-level care referral hospital regarding various aspects of their stay in the emergency room as mentioned above in the “Process of emergency” section. This observation will be made over a period of 3 months for all cases who visited the emergency. A detailed evaluation of the time involved in several different segments of the patient’s ER stay will be evaluated, and the longest segment will be identified from this observation. After a period of 3 months, an intervention will be made to decide how to reduce that particular time factor. Thereafter, over a period of the next 3 months, the same observation will be made to see the impact of the intervention made to see if it reduces the stay of the patient in the ER. These observations will be tabulated in MS Excel format and be subjected to standard statistical methods to understand the most statistically significant aspect of the waiting time of the patient in the emergency. After implementation, the intervention, it will be observed whether it resulted in

a statistically significant improvement in the time extent of a patient in the emergency room. The study will be subjected to an ethical review committee, and ethical clearance will be taken.

The triage is located at the entrance of hospital. This hospital is an academic institute where students do their fellows in different specialties. The emergency department serves 24/7 services, and includes trauma beds, ventilator beds, acute trauma beds, and admission beds. Each shift in the emergency department has 15 nurses and five doctors.

Approximately 30 to 50 patients are visited daily in the Department of Emergency, and it varies from urgent to non-urgent cases.
Emergency department has two shifts that work 6 hours each and one shift that works 12 hours daily. At the end of each shift, nurses and doctors hand over the patient to ensure continuity of care.

Figure 2: -Flow chart



1.3 Research Problem

The Indian population is increasing rapidly, while medical facilities are limited. Approximately 67,385 babies are born daily, amounting to 24.6 million births annually. Accommodating all the patients who are visited to the emergency department is a challenge, which leads, to problems, such as diagnosis delay, unwanted specialist consultations, compromised patient care, and determining whether the patient requires admission or should be sent home or admitted to the ICU or a general ward.

Sometimes, the situation is much worse when there is an increase in patients in the emergency room, which is more than the available beds, and emergency doctors have to struggle to accommodate them. In such cases, patient safety and clinical decision-making can be strained, and the management outcomes can be compromised. Overcrowding creates a high-pressure environment, increasing the risk of misdiagnosis and other medical errors. Some patients require ICU beds, but due to the overflow of patients, they are unable to receive one, leading to the deterioration of their condition and, in some cases, increased morbidity and mortality.

In the Indian healthcare system, there is a significant shortage of doctors and nursing staff, which can overburden healthcare workers, leading to a stressful environment and decreased efficiency. Additionally, a shortage of beds and medical equipment in hospitals contributes to overcrowding in the emergency, which results in revenue by decreasing the number of patient admissions. It’s been observed that several emergency cases are delayed due to a limited number of healthcare workers and overcrowding issues. Several aspects of the healthcare management throughout the hospital system, including pathology tests, X-rays, ultrasounds, and MRIs, are affected by this stagnation of patients in the emergency room, which further hinders specialists from making timely diagnoses resulting in a delay in treatment plans

1.4 Research Aims

India's healthcare system is overburdened by the sheer volume of patients. Most of the patients pay themselves for their healthcare needs. Long waiting times in the ER mean delayed diagnosis and management of patients. This might result in higher bills with an increased economic burden on the patients. Simultaneously hospitals also lose revenue if there is a slower patient turnover in ER. We plan to execute this study to evaluate each segment of the time period of stay of patients in the ER before they are sent out from the hospital or sent to as impatient ward/ ICU. To understand the patients staying in ER, the present study will be able to throw light of potential areas of development in patient management; we think that there might be many more patients who can be attended to in the ER if their time is better managed. If, by understanding these segments and appropriate intervention, we can reduce the time spent by patients ER, hospitals will benefit in their volumes and comfort for patients.

1.5 Research Purpose

Aim of the research is to evaluate and find gaps in management of flow of patients in the emergency. It also understands that in which segment patient has to wait more in the ER is the longest and what the effect of long waiting times on the management of the patients. By understanding these deficiencies, if an intervention is attempted to the emergency of the hospital, it will help to decrease the patient’s extended stay. It might have a positive impact on the turnover time of the emergency room and also on the final results of the patients.

1.6 Significance Of Study

Outcome of the research will help establish an association between the arrival of the patient, stay of patient & time taken to decide, the patient is to be going home or referral to other hospital or transferred to the ward/ICU. It will help to create a framework that can improve the flow and decrease the time in the department. This research intends to contribute to and help in improving the patient's health & mortality, improve the time management of the physicians who work hard, and boost the economy of the hospital.

Patients visited to ER of a hospital with a few expectations. They need to be attended to as soon as they arrive, a doctor should see them, investigation is required, should be advised out at the earliest, and a diagnosis or at least a possible explanation of their problem be offered to them as soon as possible. Each of these segments of a patient stay in the ER are independent variables depending on various factors.

1.7 Research Design

The research methodology section includes the process during which data was recorded to address the various factors contributing to delays in patient first evaluation in the emergency department and their transfers, whether to the ward, ICU, other hospitals, or home. Primary origin of this research was through visits of the lead investigator, to a particular hospital's emergency department daily for three months to manually collect patient data and tabulate it in an MS Excel format. This data was eventually analyzed to understand better the problem and the various problems that influence the flow in the emergency department.

All cases that stepped into the emergency of the hospital throughout the span of data collection were included in the research. The time stamps of the patient while in the emergency room were physically examined, and various factors and timelines observed from

that hour when the patient entered ER till the time he was discharged or transferred elsewhere were recorded. The formulation of several sub-questions based on participants' responses was also recorded verbatim. Descriptive statistics were applied to analyze each time interval involved in the above-mentioned timeline, and the associated factors causing delays were evaluated. The proportion of patients experiencing such delays at each stage of the process was also noted. Each factor was systematically analyzed, highlighting areas that require more attention to increase the productivity of the department of emergency. Study tried to have deeper insights into the overall process of patient management in the ER and helped identify key areas for improvement.

The data collection process was divided into two segments: Radiology and Non-Radiology patients. In the Radiology segment, the data includes patients who require imaging procedures such as ultrasound, X-ray, or MRI to assist physicians or specialists in making a diagnosis. In the Non-Radiology segment, the data includes patients who do not require any form of imaging (such as X-ray, ultrasound, or MRI) for their diagnosis or treatment plan.

1.8 Structure Of Thesis

The thesis write-up is divided into five major segments.

Segment One—Introduction: Provides a view of the study, which includes its scope, background, and nature. Apart from the objectives, purpose, significance, and aims of the study, this segment also defines the probable factors influencing the managing the flow in the emergency room and possible problems.

Segment Two—Literature Review: Segment gives a descriptive summary and literature that exists and is reviewed by the researcher in the field of this research problem. It highlights significant work applicable to the study and emphasizes the importance of the research. Additionally, it identifies gaps in the existing literature, which the study aims to address and bridge.

Segment Three – Research Approach: This segment outlines the research methodology and approach used. Covers various theories related to quantitative and qualitative research and the data collected and analyzed. Additionally, it highlights factors affecting patient satisfaction and the hospital's revenue loss.

Segment Four – Research Findings: Gives the important uncovering fact of the study, the observed delays in various aspects of the timeline during patient management in the ER, and identifies the steps hospitals can take to address critical factors and improve outcomes based on the study's results.

Segment Five – Conclusion: This segment presents the final findings of the research, highlighting key factors and red flags identified during the study. It also discusses the study's limitations, practical applications, and direction for research.

CHAPTER II:

LITERATURE REVIEW

2.1 Introduction

This research lays out the current information and knowledge available on the topic. It will also be used to point out existing material to reinforce the research topic. This section will thoroughly review the following topics.

Literature pertaining to overcrowding, flow of patients, decreased quality care, poor outcomes, increased patient time, patient dissatisfaction, increased workload, medical errors, and other aspects of literature associated with the topic will be evaluated in this section.

2.2 Previous Research and Objectives

According to Santos, E. *et al.* (2016), the Emergency Physicians of American College, overcrowding is defined "a scenario that arises when the demand for emergency services surpasses the available resources dedicated for patient care in emergency departments or hospitals" (2).

Increased length of stay in the emergency department is a worldwide tough situation, as every year patients are increasing, who need treatment in the emergency unit. With the increasing number of patients, the emergency department becomes overcrowded, which leads to prolonged stays of the patients, which, in turn, is associated with several problems in patient care (1).

Emergency department operates round the clock and is responsible for providing Acute patient care, who come to the emergency without any given appointment. Overcrowding or excess patients in the department has appeared to have many repercussions like reduced the quality of care and poor outcomes (3), diversion of ambulances to other hospitals (4), increased patient waiting time (5), increased medical errors (6), frustration among emergency department staff (3,7), increased cost of care (8), increased workload (9) and increased patient dissatisfaction (10). Complicated or severely ill patients may withdraw to the emergency or hospital without being attended to by a doctor as prolonged waiting time in an emergency, and they come later with more complications (8). Overcrowding in emergency also reduces new admissions in the hospital and delays in management decisions, which leads to prolonged hospital stays and increased costs for the patients (1)

The first study related to overcrowding in the emergency department was 20 years ago (10). Many of the research have mentioned that prolonged waiting time in emergency departments is associated with overcrowding (11,12). It is mandatory for patients who present to the emergency room to have a full medical evaluation, whether they are paying the hospital or not (13). A long wait in the ER will naturally be seen in such areas. According to a US survey in 2002, 90% of big healthcare institutes report Emergency departments working “at” or over capacity (14). Overcrowding in emergency room/department causes delays in treatment, delay in diagnosis, patient outcome and decreased quality of care (14,15). In all the hospitals in the United States, it has been noticed that the median waiting time in the emergency room is 5-8 hours in the hospital. In the past 20 years, the admissions in emergency departments have increased by 50% in the United States (16), whereas in Australia, the yearly admissions jumped by 3.4% (2017-2018) (17). Emergency visits have increased by 42% (1997-2017) in the UK (18), 10% in New Zealand, and Belgium 5% (19). Higher magnitude issue in developing countries. Mexico hospitals faced a rise in demand by 62% in the last 3 years

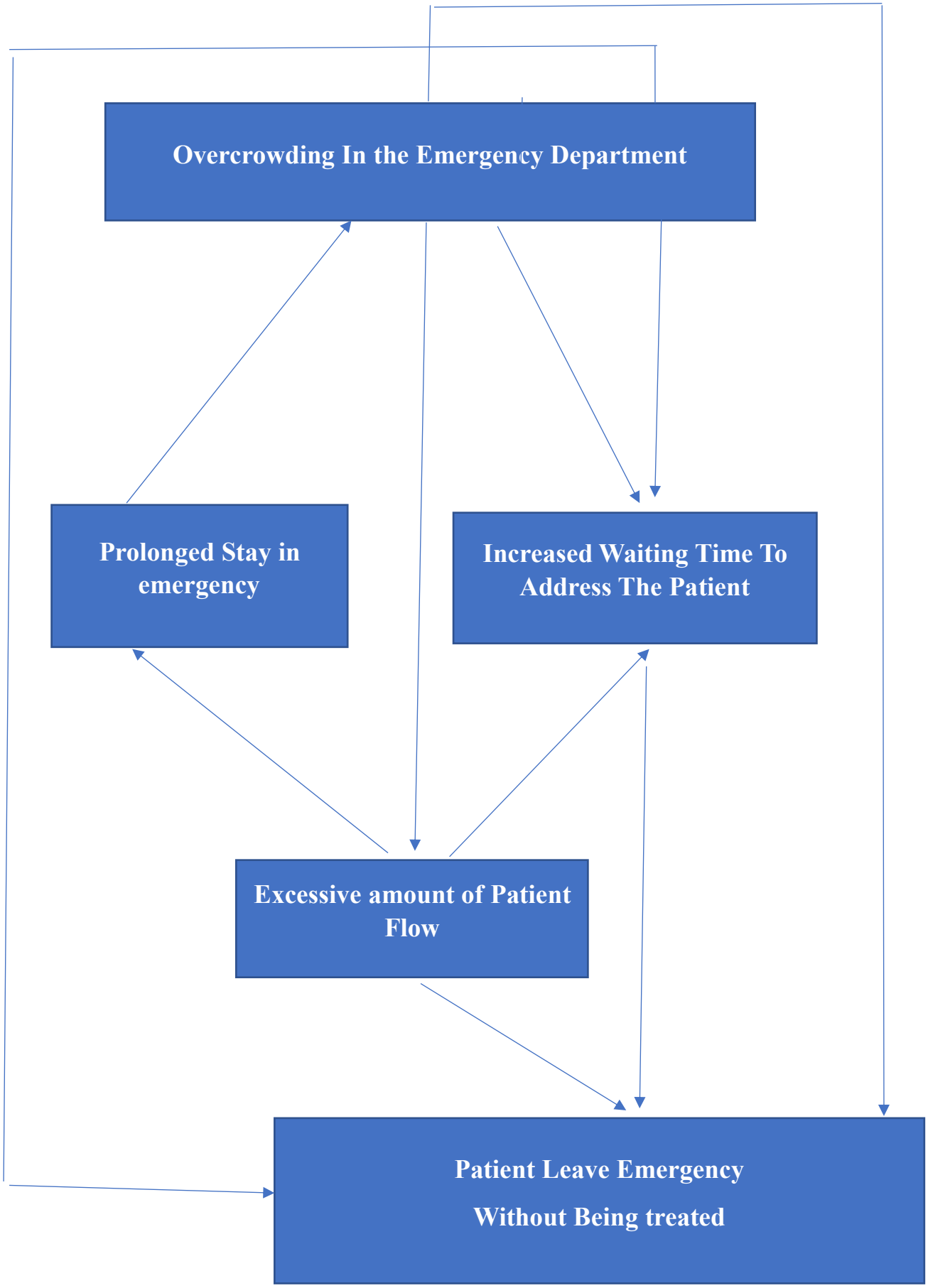
(20). During this duration, the Health Ministry and Social Protection of Colombia published that admissions increased by 125% beginning from 2011 to 2018 (21).

Emergency department generates admissions, which contribute significant revenue for the healthcare system and hospitals. England (UK), in 2009/2010, the National Health Care (NHS) evaluated, admission cost of the patient to be around £20.5 billion, in which the emergency department contributed to about £11 billion alone (22). In some countries, the countries infrastructure of the hospital, like the limited number of beds, compromises patient privacy and confidentiality as patients are treated in compromised situations, for example, on a chair or a stretcher (1). These factors are acknowledged as important and are the main cause of concern in numerous countries (both developed and developing) like the United States of America, Canada, Brazil, Australia, Ghana, Taiwan & Netherlands (1).

Long stay in the emergency department leads to long queuing times, overcrowding, and dissatisfaction among the patients. The above-mentioned communication is an indicator of interconnection among the leading problems in the emergency department (23), and initiatives towards improvement on components have a positive impact on the entire emergency delivery structure. Crowding in the emergency is the biggest problem worldwide, with more waiting time and cost constraints. In developed countries, especially, face crowding in emergency departments, leading to increased discomfort of patients, inability to give elective care to the patients, and increased length of stay (LOS) in ER (22). Overcrowding in emergency departments is not only specific to the United States. Insufficient inpatient bed availability is directly interconnected to overcrowding of the emergency of the healthcare institute in the United Kingdom and Australia as well (6).

Few studies have addressed this issue of time management in the ER, where they found an average of 4-5 hours of waiting time in an emergency. Sometimes, patients wait for several hours to get admitted through emergency rooms, which leads to clinical deterioration of the patients. Some of the studies have found that by reducing the waiting time outside the emergency room from 50 min. to 30 minutes results in a positive impact on the patient's safety and better clinical outcomes. United Kingdom, National Health Service (NHS) sets a 4-hour target whereafter a patient needs to be moved out of the ER (9). As about 50-70% of admissions to the hospital actually happen through the emergency, the issues in the emergency need to be tackled on priority (25).

Figure 3:- Interconnected Problem in the Emergency Room



Five main problems in the emergency department: causes and repercussions

1. Overcrowding in emergency department

Overcrowding in emergency departments leads to an imbalance between emergency care requirements and the supply thereof because of decreased functionality. Overcrowding has become a worldwide concern, which leads to patient dissatisfaction, poor clinical results, increased waiting time, and aggressive behavior of patients and/or attendants (26). Studies have concluded that this mismatch is probably because of several factors along the supply chain within the hospital setup (27), like available beds for cases in the emergency, an excessive of non-urgent visits to emergency, and paucity of staff among others.

2. Prolonged stay of patient

Prolonged patient stay is the entrance time of the patient and the discharge/shifting the patient out of the emergency to ICU or wards. It causes increased patient cost, high risk of infection, missing out on patients needing critical care and diversion of patients to other hospitals. Prolonged length of stay is also an important key to excessive flow and is basically important for internal audits to provide efficiency, improve the performance of staff, and better decision making. To solve this issue, some health authorities have integrated policies to decrease the stay in an emergency (for example, a 4-hour target in the UK) (28).

3. Increase waiting time to address the patient

Increased more than-expected time is defined as the gap between the arrival of the patients in the emergency and their first contact with the doctor. Most of the studies have found that timely attention to the patient by doctors is an important factor for patient satisfaction in the emergency department (29). An increase in waiting time leads to several problems, such as delays in admission, increased morbidity, and several complications.

4. Excessive patient flow time

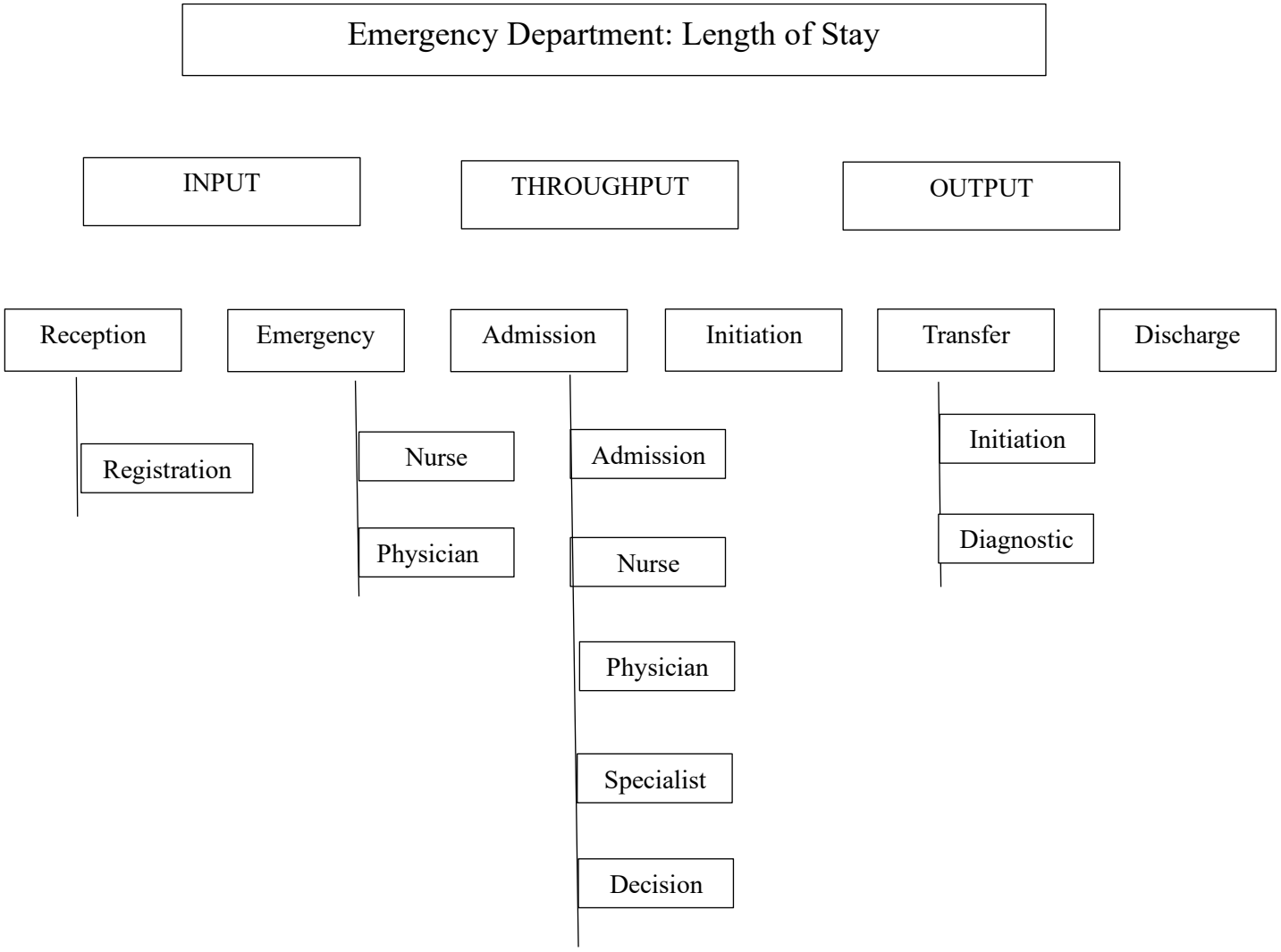
The factors leading to the excessive patient flow in an emergency include a lack of parallel supporting processes, shortage of medical staff, departmental layout, and capacity of the emergency department. If these factors improve, it leads to satisfaction rate, a decrease in death rate and morbidity, and significantly minimize the cost to the patients (30).

5. Patient leaves emergency without being seeing

Leave without being seen (LWBS) is the quality metrics in the hospital. Some cases leave the emergency without being treated by a clinician usually report a deterioration of health compared to those patients who were addressed. In addition to this (LWBS), patients return to emergency again after a few hours with worsening in their health, increased costs to patients, and medical and medicolegal complications (23).

One study defined input, throughput, and output factors for overcrowding. This model seems helpful for understanding the segments that modulate the capacity and movement of patients in the emergency department (31).

Figure 4 : Framework of Input, Throughput, and Output



Input factors include access and condition of the patient, the number of cases actually in the emergency room, severity of their problems and symptoms. It is a major source of overcrowding but is probably less significant (31).

Throughput factors are the intrinsic factors that comprise the processing time in an emergency. Time taken to see the patient and outcomes where the patient has to be either shifted to the ward or discharged home are a part of this segment. It includes all diagnostic procedures, imaging & laboratory analysis of the patient. All these parameters are actually contributed to by the healthcare personnel (31). One of the important factors determining the extended stay of patient in the emergency is either at the point where the patient arrives in the emergency or is being shifted or discharged from the hospital. However, some of the studies indicate that the stay of the patient in the emergency department (ED) depends upon the diagnosis and course of patient (32).

Output factors include the time of visit of patient in the emergency department, bed availability, and time taken to leave the emergency department. Insufficient hospital beds cause overcrowding and lack of home assistance. It is noticed that over the past 20 years, there has been a reduction of beds by 50% in emergencies, and this is a global phenomenon. This causes an "exit block" and decreases the possibility of admissions of patients to the wards (31). Exit block is defined as "those patients who require inpatient care who are admitted to the emergency department, and they are not able to get hospital beds within suggested time (4)."

Most studies found that 30% of the patient who visits United States of emergency department are non-urgent. Recent study showed that 4.4 billion USD can saved annually if those visits are curtailed and these patients are treated in small clinics or nursing homes. If these patients were channeled to such facilities if they were open for non-urgent care during specific hours, this saving could be even more (33). It looks like in the future nonurgent emergency department (ED) demands will only increase because of a paucity of primary care providers. One survey conducted in 2006 showed that ER physicians (about 30%) have exhibited a lack of interest in seeing non-urgent visits (34). Some of the NGOs, social

workers, and societies educate the public on the usage of the emergency department appropriately; however, despite all these attempts made by the healthcare providers to minimize the “Non-Urgent visits,” they only continue to increase (35).

An important factor that increases the patient stay in the ED might be probability of patients who are so-called “Safety Net.” These are those patients who cannot pay by themselves and are also not covered by medical insurance. Ethically and legally, the ED is bound to take care of these patients, even if they do not contribute to the revenue. It’s important that such patients are mobilized from the ED as fast as possible (6).

The volume of cases in the emergency room, bed number in the triage, laboratory tests, the requirement for a superspecialist consultation after the assessment of an emergency doctor, and diagnostic images like CT and MRI are the factors that determine the patient's movement in the triage (36). In an Australian study, Exit block increased the waiting time, and contributed up to 60% of the increased time of patients in the emergency (37). Several studies have evaluated how exit block has a negative impact on patient outcomes; for example, those patients requiring urgent care like surgery or any psychiatric consult are not attended by physicians because of an increase in waiting time (31).

Some of the articles have found that emergency department crowding has seasonal variations. In a Los Angeles country hospital, a 4 to 7 times increase in diversion of the ambulance to other hospitals is seen in the peak viral season as different to another season of the year (38); likewise, Toronto hospitals recorded that the waiting time in ER is about 2.5 hours per weak more in the flu season (39).

Articles have also shown that crowding in emergency departments relates to a shortage of staff. For example, an average doctor has 10 patients, and an average nurse has 4 patients to

attend to at the same time (40). A study which was conducted in California discussed that less no of doctors and nurse leads to a longer stay in emergency for primary care (41).

A Study in Portland showed, shortage of hospital beds was linked to increased diversion of ambulance services to other hospitals (42). A survey of Korean emergency departments associated the high occupancy of hospital inpatients with crowding in the emergency department (43).

Several articles showed that when emergency department occupancy is 100% some of the patients leave emergency without seeing any physician (44). It was noticed in these studies that of those patients who come to hospital but due to business of emergency they left without being seen by healthcare staff, 11% were hospitalized within a week to the hospital, and 46% required urgent medical treatment (45). Articles described the financial impact of emergency-related issues. One study reported that hospitals lose $204 of prospective revenue per patient because of increased boarding time (46). Other study calculated that if the patients stayed in emergency department longer than a day before being shifted to the IPD, it expanded costs by $6.8 million over three years (47).

One of the reviews identified that the diversion of ambulance services to transport the patients to other hospitals leads to a loss of host hospital revenue. This also causes bed occupancy by those patients who need to be transported out of the host hospital but can't leave because of a lack of ambulances to do so (48).

In a recent meta-analysis, the value of intervention in the management of flow of length of patients stay, patient volume, waiting time, and discharge process was evaluated after careful evaluation of nine such studies. It was almost universally visible that time management in the emergency room resulted in improvement in all the above parameters. Hospitals in Botswana

noticed the long stay of patients in the emergency of the hospital which is increasing, which affects services of an emergency department, and they proposed that interventions were required to try and turn down this waiting time (49). A similar study from Nigeria stated that the median extent of time was 6 hours in the emergency departments of private hospitals and more than 24 hours in the university hospital (50).

Sensitized by the lack of effect of the interventions on reducing the overcrowding in the ER, the American Academy of Emergency Medicine drafted a statement "highlighting the uncertainty surrounding the strategies to enhance the best solution to fix throughput in the emergency department" (Eitel, D.R. *et al.*,2008) (51). Several studies have evaluated the interventions done to decrease the waiting time in the ER. Some of the new strategies initiated by the healthcare workers to decrease ER waiting are to focus on flow orientation, participation of all associated workers, continuous improvement of quality, and decrease of the unnecessary time-consuming work (26).

One of the articles says that if the number of doctors per patient is increased in the emergency, it will help to manage the time of patients in the emergency department by 35 minutes (52). One of the hospitals observed that if extra physicians were hired on a reserved basis when needed, especially in a flu season or viral season, the waiting time could be reduced by 15 minutes, and some of the patients leave emergency without seeing clinician could be reduced by 37% (53). Two articles observed that the creation of observational units, especially for patients requiring intervention or procedures, can be used effectively to decrease the waiting time in an emergency (54).

In 2004, the United Kingdom introduced an emergency care target based on time to abolish emergency department crowding. They imposed an upper time limit of four hours on the

length of patient stay from the time of visit at the hospital to transfer ward or ICU or discharge from the hospital (55). The Health Department established a standard of care for hospitals in the National Health Services (NHS) scheme stating at least 95% of patients visiting an A&E department should be seen, treated, admitted, or discharged within just 4 hours, (Blunt, I.,2014) (5). Time-. based target (4hr) set initially in 2004 was 98%, but later on, it was reduced to 95% in 2010, United Kingdom. This clearly shows that the time constraints of the ER continue to cause critical problems in patient flow. Many countries like New Zealand (56), Australia (57), and Canadian territory (58) have imposed the same emergency care target based on time from arrival to emergency and departure, which varies from four to eight hours. Time-based targets in emergency departments have shown in a decrease in the stay in emergency setups and in-hospital mortality (59).

One study observed that the formation of a short-stay medicine unit for chest-related issues, like asthma patients, could decrease the stay in the emergency (60). Hernandez et al., 2014, launched a “Discharge Hospitality Centre” project to address the issue of overcrowding in the emergency. They found that within 4 months, early discharge of patients maximised from 33.4% to 41.5%, time from the announcement of the discharge by the clinician to the actual time the patient left the hospital premises decreased from 126 minutes to 84 minutes, and patient stay in emergency department decreased from 24.6 to 15.8% (61).

Currently, available literature indicates that interventions in managing flow of patient in the emergency room have resulted in less waiting time and better patient experience. In a tertiary care hospital like Iran, the most visited Emergency department in the country (62), different aspects of the patient stay in the emergency room were evaluated, and a discharge lounge was created on the premises, where the patient could wait before they go home or are transferred to the ward (63).

Simulation techniques were utilized in the emergency room, and by utilizing minimal cost and resources of the hospital, the flow of patients by various interventions was observed by utilizing graphic software. It was observed in the study by this intervention showed a statistically significant improvement in the time that patients spend in emergency, turnover and satisfaction of patients in the department (64). According to Khara et al., computer simulation is observed to be an encouraging technique that gives improvement in the process of emergency without any hindrance in patient care (65).

It is noticed in some of the studies that establishing Acute Care set up in the hospital is a good solution for patients who need early attention but are not at high risk (for example, headache or mild chest pain) if they are treated under observation of the doctor while receiving the medical care it reduces the hospital stay

In the last decade, many hospital setups and healthcare organizations have started adopting the Lean thinking approach to provide better healthcare facilities. The lean thinking approach constitutes an improvement in patient care in terms of quality (66). This organizational approach gives significance to finding the origin of the problem from the workplace and workers of the organization to understand the main problem, which helps to improve the system of the organization. In 2 years, lean approach used in Virginia Mason Medical Center showed significant improvements in productivity (36%) of employees were repositioned to other positions in the hospital), set up (82%), space (41%), inventory (53%) and lead time (65%) (22).

Three studies tried to evaluate the role of the communication gap between the employees, which could block the patient flow. Another lean intervention was changes of roles and job responsibilities (e.g., Floor managers, screening nurses, members of physician team)

computer system implantation. The lean intervention approach shows a remarkable reduction in the stay length in the emergency department (LOS), cost reduction, LWBS, increased patient satisfaction, and increased patient volume (22).

Approaches to intervention in time management of patients in the emergency department can be divided into groups. There are five groups which showed a different intervention to help reduce the extended time and patient flow in the unit of emergency of the hospital.

FAST TRACK

Thirteen studies explained the smooth flow of patients in the emergency department using fast track system (26). In a study conducted in New Zealand, a process they named "Rapid Assessment Clinic" was started in which, during the odd weeks, patients with less complicated problems were evaluated and treated (67). It showed waiting time of patient stay in triage levels 4 & 5 was reduced with this intervention. An Australian Cohort study in 2008 evaluated 20,000 patients who were divided into two classifications, one where the fast-track approach was applied and other hand in which it was not applied. The study came to the conclusion that the waiting time in an emergency was significantly reduced with the fast track (68). Another study from Australia observed that if 33% of the patients in the emergency were seen clinically by a senior consultant in the fast-track model, patients who left without treatment in the emergency unit dropped by 50%. Waiting time was also significantly reduced (69).

One of the largest observational studies conducted in Spain examined the outcome of the fast-track model on about 71000 patients (70). It was found that after the introduction of this model, the waiting time of the patient in an emergency was reduced to 50%, and the length of

stay was reduced by 10%. There was an increase of 44% in patients who attended the emergency services during this period. A study was conducted in Australia where 10,000 patients. Study was conducted in two groups. One group included patients evaluated with the Rapid Assessment Team, comprising doctors and registered nurses, and the second group had patients evaluated without the Rapid Assessment Team. It was observed that waiting time targets were attained 59% with RAT compared to without RAT which is 39% (71).

POINT OF CARE TESTING

It is defined as fast-moving laboratory testing of patients admitted to the emergency department to speed up diagnosis of the patient. A small randomized study from Canada observed a reduction in the stay of patients in the emergency when they initiated laboratory testing on the spot for non-admitted patients (72). A similar US study observed a high satisfaction rate amongst the staff with a decreased turnaround time and decreased length of stay with POCT (time from placing the order to laboratory tests to the availability of results for the treating doctor) (73).

STREAMING

Streaming is defined as a routine where the patient comes to the emergency and is attended to by a physician who evaluates the condition of the patient and further subdivides the action into different processes according to the condition of the patient. One of the streaming processes includes a fast-track model to treat less serious patients. Two studies differentiated patients into two different paths, one where they could attend the hospital outpatient departments and the other that would require admissions (26). In another study, the patients

were divided into two parts where patients were attended by two separate teams of nurses and doctors (74).

This process is called ‘Team Assignment.’ It was observed that with this approach, number of cases that left without being treated in emergency was decreased by 2.3% to 1.6% and decrease in waiting time by 9 minutes on average. King et al. were not able to signify a decrease in waiting time as the group was large, 63,000 and 90,000 patients, sequentially. However, a decrease in the stay of patient in the hospital showed in both streams. Decrease in stay, shorter patient waiting time in 2 of 5 emergency levels. The emergency department also achieved the 4-hour target goal of waiting time (26).

NURSE REQUESTED X-RAY

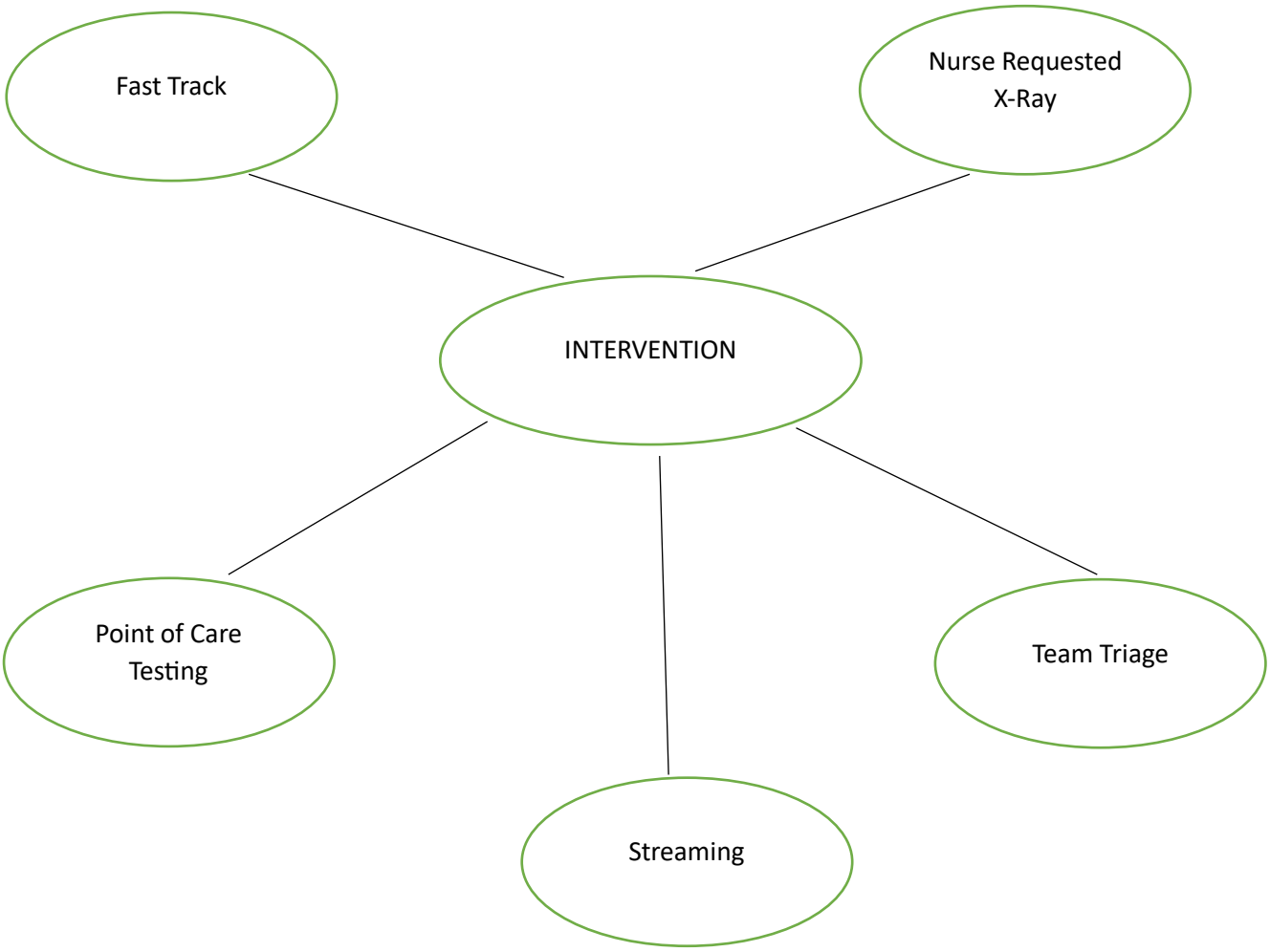
Examination is the basic radiological investigation that is X-Ray to evaluate patients in the ER, but it is a time-taking process. To reduce waiting time, some of the health care centers have derived a routine of nurse-requested X-rays. 1800 patients were enrolled in a British study; in this, they took patient injuries below the elbow and knee (75). Patients were divided by emergency nurse to “nurse first” or “doctor first.” this group of patients was seen by the nurse first. The extended stay of patients in the unit of emergency was reduced the cases who did not need any radiology examination. In contrast, there was no difference between the two groups for those needing an X-ray. It has been observed in the study. It was also observed that the Nurses ordered X-rays 4% more than the doctors. Another quasi-randomized study was conducted in Australia, in which a physician ordered X-rays on even dates, and a nurse ordered X-rays on odd dates in patients with foot or hand injuries (76). In this study, no particular difference in emergency department length of stay was observed between the groups.

TEAM TRIAGE

Team triage is a team that includes nurses, doctors, and staff. The team triage is important for the initial evaluation of the patients. A study from Canada, in which 6000 patients were enrolled and evaluated by the team of triage to look for the LWBS & LOS (77). The association of doctors smoothens the flow of patients by assisting the triage nurse, assessing ambulance patients, handling administrative queries, and initiating diagnostic or laboratory procedures. It was observed that LWBS was decreased by 20% and LOS was decreased by 11%. Partovi et al., from the USA, observed that including a senior emergency doctor in the team decreased the stay of the patients by 82 minutes (78).

It is foremost to acknowledge the factors, causes, effects, and solutions of the emergency department and crowding problem as evaluated by The Health Care Committee of the United States (71). In most countries, emergency departments have been struggling with crowding in the emergency rooms for several decades (79-80). Studies have indicated that the crowding in the emergency room is either at the point of patient arrival or shifting out of the patients from the ER for any investigations or transfer to the ward/ ICU. Some reports indicate that the crowding in the ER is not static, and it can fluctuate according to the patient's Emergency department stay and turnover (81). The review of available literature on this matter indicates that well-designed studies are scarce in this area. There are no studies that address the different time segments of the patient-occupied bed in the ER, particularly from part of the world**.**

Figure 5: Intervention in time management of patient



2.3 Gaps In The Existing Literature and Research

Literature is rife with studies that have addressed the waiting time in an emergency and its impact on various aspects of healthcare in hospitals. However, there is a paucity of such work from this part of the world, especially in India. The psyche of Indian patients is different from

the rest of the world. They are very impatient, result-oriented, and demanding. Cost-effectiveness is also important for them because they are paying from their pocket, whether it is private insurance or other insurance. The overall experience has to be satisfying for them. All these factors are inversely proportional to the waiting time that patients have in the ER. Our study will focus on evaluating this aspect of hospital management so as to identify the causes of extended patient stay in hospital emergencies, attempt to have a better understanding of their causes and repercussions, and identify a methodological approach used for the solutions.

2.4 SUMMARY

By conducting this study, we intend to identify the segment that includes the patients stay in the unit, which is the longest. We will try to understand the reasons for the same and implement measures to reduce this time segment. We hypothesize that our interventions will eventually result in a decreased patient stay in the emergency room, which in turn will increase turnover of the patients in the ER, a better patient experience, and a revenue resource for the hospital as more patients will be able to be accommodated in the emergency room. From our understanding of the topic, we are of the option that most of the spent time by patients in the ER would be in the logistics of patient movement.

CHAPTER III:

METHODOLOGY

3.1 Introduction

Will express the non identical elements of how research will be conducted, the conducting principles, and the description and ideology of study.

Research is presented in a descriptive study that defines all the factors related to time management. This research is a quantitative retrospective cohort study that includes a model of input-throughput-output that will evaluate the execution of patient journeys in the emergency unit. The potential area of delaying admission to discharge in an emergency will be evaluated.

Retrospective Study

The study employs a retrospective cohort design, allows for analysing pre-existing hospital data without interfering with real-time patient care. Retrospective studies are particularly beneficial for hospital workflow analysis, as they provide historical insights into operational inefficiencies. Compared to prospective studies, which require real-time monitoring and data collection, retrospective studies are less resource-intensive and can identify long-term trends in emergency department bottlenecks. However, one limitation of retrospective research is the reliance on existing hospital records, which may lack uniformity in data entry. To mitigate this, the study carefully validates data accuracy through cross-referencing multiple sources within the hospital information system.

The collection of data from the hospital information system is the most reliable tool to understand the segments of the stay of the patient in the hospital. We want to understand the time stamps of the patient's stay in ER. HIS is going to be the most obvious tool. We intend to retrospectively look at the flow of patients stay in the hospital for which HIS appears to be the most reasonable method.

The questionnaire consisted of eight questions that utilized existing records from the hospital system, allowing the researcher to easily analyze the time tracking according to questions and patient journey.

By observing the real-time tracking of the patient journey and patient flow, a retrospective study allows the hospital to assess the impact of hospital policies that the department has introduced in the past. Based on this evaluation, the hospital can implement new policies like increased staff, efficient operational working, and new triage policies.

3.2 Problem Statement

This section will provide a view to narrate the problem this research offers to address or solve. It will also give the rationale behind why this problem needs to be resolved. The problem statement will be used later to formulate the research questions.

Emergency department operates round the clock and is responsible for providing acute care for patients who visit the hospital at any given appointment. Increased patient visit in the hospital's specially emergency is a worldwide tricky situation; every year, the number of patients who need health care in the emergency increases, which leads to several problems, both for the patients and hospital management. There is no study performed in India as such addressing this issue. If the time management of patients in the emergency room could be tackled, then the movement and more patients in the hospital would increase, and disposal of

patients from the emergency department either to the ward or home would be faster. This will lead to better patient satisfaction and decrease the chances of a missed diagnosis. Patients tackled on time in an emergency will increase, unseen patients in an emergency would be less, and readmission to emergency would decrease. This will help the hospital in terms of revenue & patient turnover.

3.3 Research Objective

Objective of this project is to control or find out the impact of overcrowding of the patients in the emergency room, which causes delays treatment. The study will seek to achieve this by explaining the relevant questions.

The primary objective is to evaluate the factors that affect the time spent in the emergency department by the patient before being sent home or shifted to the ICU or room.

Second, to identify the most important factors among the above-mentioned delay that affect the transfer of patients to the ward or home. To change, a shorter ER stay for patients can be ensured.

Tertiary, if this study enables us to understand the aspects of a patient's flow in the ER that need to be addressed or changed, a shorter ER stay can be assured.

Fourth, the research's final objective is to give a better experience for patients in the hospital's ER room waiting to be admitted or sent back home.

3.4 Aims

To observe if, by intervening in the factors identified above, there is a possibility to reduce the stay of the patient in the emergency room.

Sub-questions:

• Time to observe the patient presenting in the emergency room

• Time taken by the patient for registration in the hospital and bed allotment in the emergency room.

• If the patient is discharged after the first review by the doctor, then how much time is taken between the decision and the actual vacancy of the allotted bed to the patient

• Time taken after the first review of the doctor to call the specialty doctor for further assessment and the specialty doctor taken time to evaluate the patient.

• Time is taken between the relevant investigation written by the specialty doctor and the actual performance and reporting of the investigation.

• Time is taken to complete of investigation and final review by the speciality doctor

• Time is taken after the decision of the specialty doctor and management to create of bed in the emergency room

3.5 Research Population with Sampling Method

Research of this study will be done by observing the patient who presented in the emergency of the hospital. The researcher will observe entire stay of the patient and their family in the emergency room. Considering the size and scope of the research, a sample size of 200-350 patient records in an emergency department of the hospital, a 300-bed hospital institute, was audited over a period of 3-5 months; it can be increased until the data saturation is reached.

Inclusion Criteria

- Patients who visit the emergency department follow the entire registration process for care in the hospital's emergency department.
- Those patients are admitted to the emergency room and referred to another department or are discharged to home or referred to another hospital.

Exclusion Criteria

- Patient who visits emergency but left without being seen (LWBS)
- Patient with incomplete medical records.
- Those patients who were admitted directly to the ICU without follow emergency registration process.

3.6 Time Horizon

To keep the research within a sustainable time frame so that it is feasible and the results observed and presented are still reasonable, a time frame of 3-5 months from the first day observed by the researcher in the emergency department will be set. An estimate is between October 2023 and March 2024.

3.7 Data Collection And Management

Data were collected by the standardized checklist made by the hospital and the hospital's information system. Data is managed in an Excel sheet, which needs to be evaluated and tabulated on the MS Excel spreadsheet. Patient’s records will be kept under strict confidentiality.

3.8 Data Analysis Strategies

After collecting the hospital data, the researcher will use Descriptive statistics to analyze it. Mean and median standard deviation will be analyzed to summarise the watch-out time and extent of stay.

3.9 Strengths and Weakness of The Study

Strengths include addressing the underlying problems in the emergency department that lead to patient suffering and evaluating the aspects of hospital management to identify the cause of extended stays in the emergency room. Weaknesses include trying to resolve the factors of the delay in the emergency department process and suggesting intervention for a better outcome.

3.10 Research Significance

This study evaluates hospital management aspects to identify the factors causing visit of patients in the hospital of emergency unit, attempt to better understand their causes and repercussions, and identify a methodical approach used for the solution.

3.11 Research Study Motivation

I wanted to pursue a career in hospital management, so I needed to explore the underlying problems of the emergency room of the hospital. Improvement is needed to help us control

time management, patient cost, satisfaction, mortality and morbidity, and increase the revenue of the hospital, which can help the hospital provide first-class care to the patients.

3.12 Potential Outcomes

We think that the most important aspect of the prolonged stay of patients in the ER is managerial, which means that the management of the patients' registration process and movement of patients getting investigated most likely factors will be the most impactful. Addressing all these issues, we can give some kind of strategies, or we can think of making or recreating a small unit such as a discharge lounge or waiting area where patients get 24 by 7 first aid care till that time, they get a bed or are discharged to home or shifted to ICU/ wards.

3.13 Research Design Limitation

All research has limitations and challenges that may affect data collection and findings. This research was evaluated in a hospital's emergency department, where real-time patient activities were recorded to understand the problems and managerial issues. The emergency department is always a crowded and time-sensitive zone where several things are happening at the same time, making data collection challenging. Additionally, documentation in the emergency department is difficult, as healthcare professionals often struggle to find time for it due to the continuous influx of urgent medical cases.

It was observed that the behavior of the staff changed when they realized they were being monitored as part of the study. Various studies have defined overcrowding in the emergency department in different ways, including staff shortages, bed occupancy rates, physician

workload, seasonal flu outbreaks, patient discharge or transfer processes, and healthcare policies. These factors present different challenges in accurately measuring real-time conditions.

3.14 Conclusion

The research has explored a quantitative method of research design where the researcher collected the data on their own. The researchers spotlight the important factors contributing to patient overcrowding, long stays in emergencies, and delays in various hospital processes. By finding the problems in the registration, initial assessment by nurses and doctors, and transfer of patients to procedures, wards, ICU, other hospitals, and home.

The findings suggest that intervention can considerably reduce the time spent in the emergency room, which helps with excess flow of patients.

Implementing strategies like improving staff coordination, enhancing hospital workflow, creating dedicated discharge units, and better-utilizing hospital resources can lead to better patient outcomes and increased work efficiency in the hospital.

In the longer run, this study aims to provide a strategic plan to the hospital management that supports the system to reduce the overcrowding in the emergency department, steamline the hospital operations, and improve the overall satisfaction of the patient.

CHAPTER IV:

RESULTS

4.1 Introduction

Introduction section covers the research outcomes and its major findings. It is roughly divided into two parts. The first part covers the research case, focusing on the study and its participants, and provides factors for the research. The second part includes the data analysis, which is performed by the researcher after collecting information from the hospital and finding the reasons for each factor that contributes to the delays in emergency services.

4.2 Researcher Case

This section provides details about the factors selected for the study and the patients' backgrounds. It provides an optic view from which the rest of the study can be observed.

42.1 Type Of Patients Chosen For The Study

In this study, the researcher recruited all the patients who came for urgent care in the emergency of the selected hospital for their treatment, regardless of age group. Across the globe, whosoever patient is coming to the emergency department must receive appropriate care, including basic first aid, to stabilize their treatment. In previous research, it has been observed that many patients initially search for care in the emergency department for their illness instead of going to their primary care physician, which creates chaos in the emergency department and, a shortage of beds and other facilities to delays. The collected data was divided into two sheets: one for Radiology and the other for radiology sheet.

4.2.2 Participant Details In The Study

The data was collected from 282 patients observed in the Paras Healthcare Hospital emergency department in Gurgaon, India.

Data includes various sets of patients with different illnesses and different age groups, along with information about their subsequent transfers to the ward, Cath lab, ICU, or referrals to another hospital.

4.3 Interpretation of Radiology And Non-Radiology Sheet Based On Questions Defining The Turnaround Time.

Table 1: Evaluation of the data in between (Radiology Sheet)

EVALUATION OF DATA	**TAT TIME**
Time of Arrival in ER TO Radiology Initiation time	30 minutes
Time of Arrival in ER TO Shift to Radiology	40 minutes
Time of Arrival in ER TO Reporting Time	1 hour
Radiology Initiate time TO Shift to Radiology	10 minutes
Shift to Radiology TO Reporting Time	20 minutes

4.3.1 Delayed Patient Transfers and Reporting in Radiology

The descriptive statistics of each time interval involved in the Radiology process are presented below, with a description of the proportion of late patients at each stage. Based on the results provided, each segment of the timeline was recorded, highlighting the areas that require attention to improve efficiency.

Table 2: Delayed Patient Transfers and Reporting in Radiology

	count	mean	std	min	25%	50%	75%	max
Time_of_Arrival_in_ER_to_Radiology_Initiate	53.0	61.754717	64.527843	3.0	17.0	39.0	80.0	302.0
Time_of_Arrival_in_ER_to_Shift_to_Radiology	53.0	160.962264	104.202274	31.0	83.0	127.0	205.0	460.0
Time_of_Arrival_in_ER_to_Reporting	53.0	238.698113	108.559021	50.0	171.0	224.0	285.0	562.0
Radiology_Initiate_to_Shift	53.0	99.207547	59.278793	10.0	51.0	90.0	130.0	240.0
Shift_to_Radiology_to_Reporting	53.0	77.735849	41.535967	13.0	45.0	71.0	110.0	240.0

1. Time of Arrival in ER to Radiology Initiate

• Mean: 61.75 minutes • Min: 3 minutes, Max: 302 minutes

• 25th Percentile: 17 minutes, 50th Percentile (Median): 39 minutes, 75th Percentile: 80 minutes

• TAT: 30 minutes

• Observations: 58.5% of patients experience delays, with the median time slightly exceeding the TAT. The wide range (up to 302 minutes) highlights a significant delay for some patients.

2. Time of Arrival in ER to Shift to Radiology

• Mean: 160.96 minutes

• Min: 31 minutes, Max: 460 minutes

• 25th Percentile: 83 minutes, 50th Percentile: 127 minutes, 75th Percentile: 205 minutes

• TAT: 40 minutes

• Observations: A significant delay is observed, with 96.2% of patients exceeding the TAT. The median time is over three times longer than the acceptable TAT.

3. Time of Arrival in ER to Reporting

- Mean: 238.69 minute
- Min: 50 minutes, Max: 562 minutes
- 25th Percentile: 171 minutes, 50th Percentile: 224 minutes, 75th Percentile: 285 minutes
- TAT: 1 hour (60 minutes)
- Observations: 98.1% of patients experience delays, with a median time significantly higher than the TAT. Delays in reporting directly affect the decision-making process for patient care.

4. Radiology Initiate to Shift to Radiology

- Mean: 99.21 minutes
- Min: 10 minutes, Max: 240 minutes
- 25th Percentile: 51 minutes, 50th Percentile: 90 minutes, 75th Percentile: 130 minutes
- TAT: 10 minutes
- Observations: Almost all patients (98.1%) exceeded the TAT. The median time (90 minutes) is drastically higher than the acceptable 10 minutes.

5. Shift to Radiology to Reporting

- Mean: 77.73 minutes
- Min: 13 minutes, Max: 240 minutes
- 25th Percentile: 45 minutes, 50th Percentile: 71 minutes, 75th Percentile: 110 minutes
- TAT: 20 minutes
- Observations: 96.2% of patients exceed the TAT, with the median time more than three times the acceptable time.

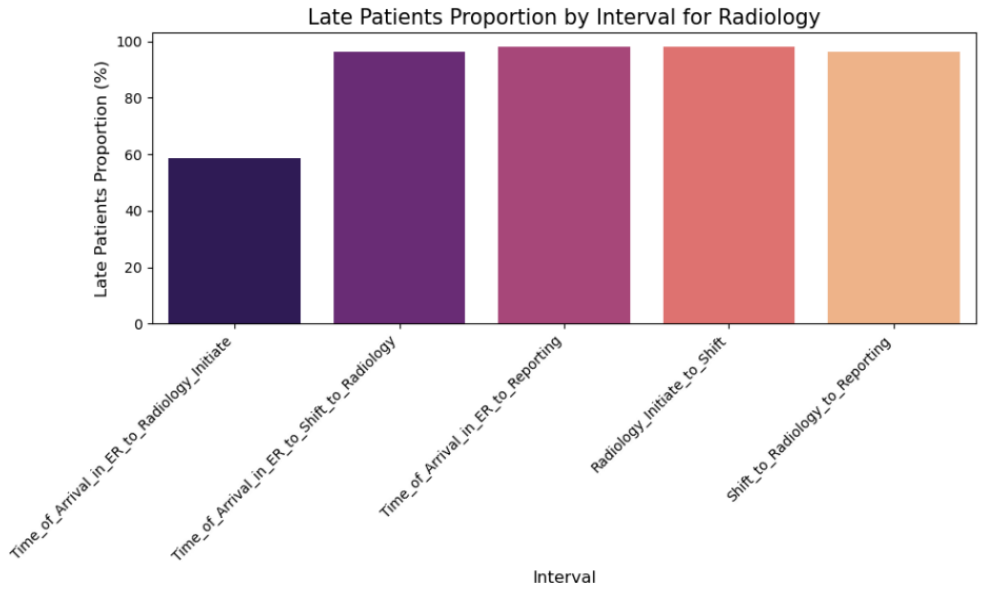
Late Patients Proportions –

The proportion of patients exceeding the Turnaround Time (TAT) at each stage is a critical indicator of deficiencies in the radiology process and is presented below:

Table 3: Late Patients Proportions

	Interval	Late Patients Proportion (%)
0	Time_of_Arrival_in_ER_to_Radiology_Initiate	58.490566
1	Time_of_Arrival_in_ER_to_Shift_to_Radiology	96.226415
2	Time_of_Arrival_in_ER_to_Reporting	98.113208
3	Radiology_Initiate_to_Shift	98.113208
4	Shift_to_Radiology_to_Reporting	96.226415

Figure 6: Graph (%) to show Late patients proportion by interval of radiology



1. Time of Arrival in ER to Radiology Initiate:

- 58.49% of patients are delayed at this stage, with a notable proportion waiting significantly longer than the 30-minute TAT.

2. Time of Arrival in ER to Shift to Radiology:

- 96.23% of patients were shifted to radiology later than the 40-minute TAT, indicating a potential bottleneck in physically moving patients to the radiology department.

3. Time of Arrival in ER to Reporting:

- 98.11% of patients experience delays in receiving their radiology reports well beyond the 1-hour TAT. This is a cause of concern since timely reporting is essential for clinical decision-making.

4. Radiology Initiate to Shift to Radiology:

- 98.11% of patients experience delays, with nearly all cases exceeding the 10-minute TAT.

5. Shift to Radiology to Reporting:

- 96.23% of patients face delays in receiving their radiology reports after being shifted, showing that there are significant reporting delays even after being shifted to radiology.

Conclusion and Recommendations

Radiology services play a importanat key role in the emergency, helping patients with diagnosis and treatment. The data provided highlights several critical issues in the radiology-related patient flow in the ER. The majority of patients experience delays at each stage, far exceeding the acceptable Turnaround Times (TATs). These delays can significantly affect the overall patient experience and clinical outcomes.

Key Observations:

• Radiology Reporting is a major bottleneck, with nearly all patients waiting far beyond the 1-hour TAT for their reports.

Physicians make their diagnoses based on radiology results. However, in some cases, these results may not align with the physician's initial assessment, which causes delays in delivering or administering treatment. The old-style reporting system is often slow and inefficient. Sometimes, unclear images can hinder the accuracy of the reports, which further contributes to delays with increased time in an emergency department.

• The process of shifting patients to radiology was also found to have significant delays, with nearly 96.23% of patients being moved later than the recommended TAT.

The delay, as mentioned above, can be attributed to a lack of transport staff appointed to shift patients from the emergency room to the radiology department. Operational issues occasionally result in poor coordination between the staff members. For patients who are immobile or critically sick, they require additional support which hampers the turnaround time. Additionally, certain procedures, such as MRI and CT scans, take longer time to complete, which leads to a maximized waiting time for emergency cases who are admitted in department.

• Radiology Initiate to Shift time is particularly concerning, as the median time is 90 minutes, well above the 10-minute TAT.

Due to the high volume of patients, physicians sometimes take longer time to initiate the radiology orders. This delay in the admission process can slow down patient scheduling for imaging.

Table 4: Evaluation of the data in between (Non-Radiology Sheet)

EVALUATION OF DATA	**TAT TIME**
Time of Arrival in ER TO Registration	20 minutes
Time of Arrival in ER TO ER Doctor Evaluation Time	5 minutes
Time of Arrival in ER TO Specialty Required, then consult time	30 minutes
Time of Arrival in ER TO Discharge/admission initiate time from ER	2 hours
Time of Arrival in ER TO Patient moving time from ER	4 hours

4.3.2 Detailed Report on Delayed Patient Discharges/Transfers from Emergency Room (ER)

Objective of this report was to survey the different factors that influence patient flow in the emergency room, with a particular emphasis on delays occurring during the primary state of emergency room management. These stages include registration, doctor evaluation, specialist consultation, discharge to home OR referrals to another hospital OR admission to the ward or ICU, i.e., the final movement of the patients from the hospital's emergency department.

Following data specify these time-sensitive segments against a defined turnaround time (TAT) if any factor greater than the TAT is classified as a delay.

Table 5: To show time-sensitive segments against turnaround time

	count	mean	std	min	25%	50%	75%	max
Arrival to Registration	265.0	40.033962	30.125916	3.0	20.0	34.0	51.0	222.0
Arrival to ER Doctor Evaluation	265.0	6.920755	5.373665	0.0	4.0	5.0	9.0	40.0
Arrival to Specialty Consult	265.0	88.256604	75.388000	5.0	40.0	70.0	120.0	746.0
Arrival to Discharge/Admission	265.0	69.607547	67.211651	0.0	25.0	50.0	91.0	550.0
Arrival to Patient Moving	265.0	296.800000	105.187754	75.0	225.0	289.0	350.0	714.0

1. Arrival to Registration

   • Mean: 40.03 minutes

   • Min: 3 minutes, Max: 222 minutes

   • 25th Percentile: 20 minutes, 50th Percentile (Median): 34 minutes, 75th Percentile: 51 minutes

   • TAT: 20 minutes

   • More than 50% of patients take longer than the TAT of 20 minutes, with a substantial portion waiting more than 51 minutes.

2. Arrival to ER Doctor Evaluation

   • Mean: 6.92 minutes

   • Min: 1 minute, Max: 40 minutes

   • 25th Percentile: 4 minutes, 50th Percentile: 5 minutes, 75th Percentile: 9 minutes

   • TAT: 5 minutes

• The median time is within the acceptable range, but some patients wait significantly longer than the 5-minute TAT, with 25% of patients waiting 9 minutes or more.

3. Arrival to Specialty Consult

• Mean: 88.26 minutes

• Min: 5 minutes, Max: 746 minutes

• 25th Percentile: 40 minutes, 50th Percentile: 70 minutes, 75th Percentile: 120 minutes

• TAT: 30 minutes

• A significant portion of patients exceeds the TAT, with 50% waiting more than 70 minutes and some waiting as long as 746 minutes for a specialty consult.

4. Arrival to Discharge/Admission

• Mean: 69.60 minutes

• Min: 0 minutes, Max: 550 minutes

• 25th Percentile: 25 minutes, 50th Percentile: 50 minutes, 75th Percentile: 91 minutes

• TAT: 2 hours (120 minutes)

• While the majority are discharged or admitted within the TAT, some patients experience significant delays, with 25% taking longer than 91 minutes.

5. Arrival to Patient Moving

• Mean: 296.80 minutes

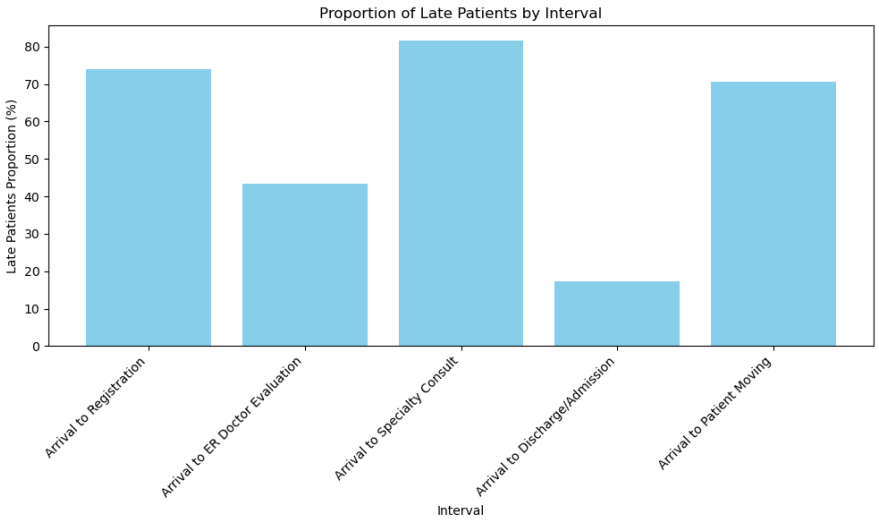
• Min: 75 minutes, Max: 714 minutes

• 25th Percentile: 225 minutes, 50th Percentile: 289 minutes, 75th Percentile: 350 minutes

• TAT: 4 hours (240 minutes)

• A substantial portion of patients take longer than the 4-hour TAT, with 25% waiting more than 350 minutes to be moved.

Figure 7: Graph (%) to show late patient proportion by different segments



Key Observations

- Registration Process

When patients arrive at the emergency room, they need to provide their personal details and medical history. Delays can occur during this process due to several factors, including staff manual data entry, verification of the patient's personal documents and insurance policy, and a shortage of staff.

- Assessment By Triage Nurse

The emergency nurse manages the initial stabilization of the patients based on their condition. Delays occur when the emergency department has many patients at a time. Additionally, a

shortage of nursing staff, especially at night, can hinder timely patient assessment. Furthermore, a lack of coordination between the management and working staff in the emergency department can exacerbate these delays.

- Evaluation of Emergency doctor

Emergency physicians examine the patients based on the seriousness of their conditions. After evaluation, diagnostic tests help to make the treatment plan. However, delays can occur due to high patient volumes in the emergency, a shortage of physicians, and long waiting times for test results.

- Speciality consultation and Radiology/ diagnostic test

After the initial assessment of patients, or upon reviewing basic reports, a patient might need specialist consultation or additional diagnostic tests suggested by specialty consultation like a CT scan, X-ray, MRI, or any pathology test to make the diagnosis. Delays in this process happen when the turnaround time of imaging results may be prolonged due to the breakdown of machines, lack of technical staff, radiology department being occupied doing inpatient tests. Sometimes radiologists are not around at night times to interpret and report the result, which contributes to the waiting time and overcrowding in the emergency department.

- Final movement of patient (WARD, ICU, CCU, REFER TO OTHER HOSPITAL & HOME)

After all completion of diagnostic and treatment, the patient is either shifted to the ward, ICU, or CCU or may be referred to another hospital or discharged to home, as instructed by a physician. Exit blocks due to slow inpatient discharge process, bed availability issues, and

delay in final diagnosis and treatment plan. Such factors can contribute to an extended stay in the emergency department.

4.3.3 Data Evaluation between the ward, Cath lab, Critical care unit, Home, Intensive care unit, refer to other hospitals and Ward

(TOTAL PATIENTS- 275)

Table 6: Data Evaluation between Ward/ICU/CCU/Referral/Home

EVALUATION OF DATA	TAT TIME
10 patients were shifted to the Cath lab	40 minutes
24 patients were shifted to the critical care unit	2 hours
47 patients were discharged to their home	2 hours
27 patients were shifted to the intensive care unit	2 hours
10 patients are referred to other hospitals	2 hours
144 patients were shifted to ward	4 hours

Figure 8: (%) Distribution of patient

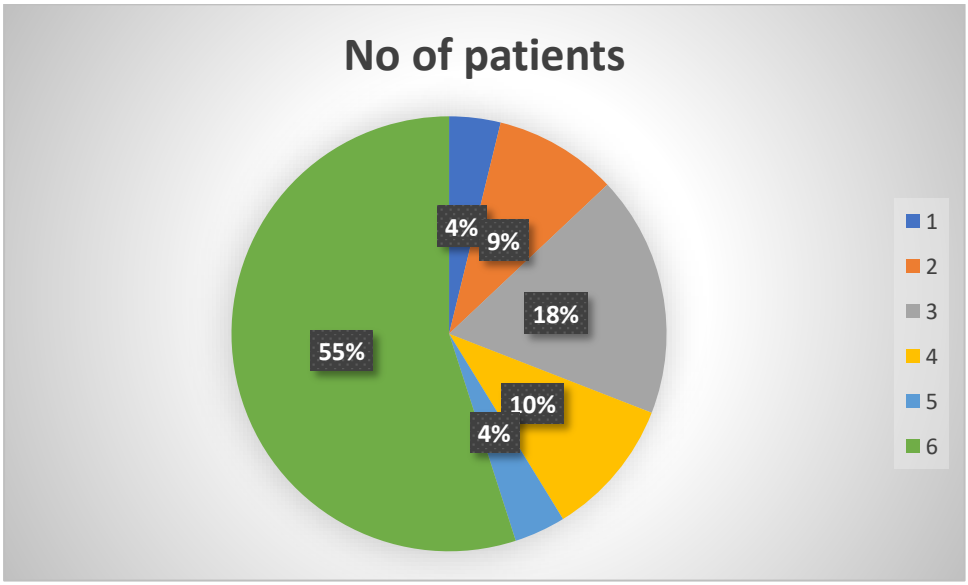


Table 7: Data evaluation between the shift category

	Shift Category	count	mean	std	min	25%	50%	75%	max
0	WARD	144.0	333.333333	95.544227	96.0	270.0	318.5	397.75	645.0
1	HOME	47.0	294.148936	78.834714	160.0	230.5	289.0	348.00	495.0
2	ICU	27.0	238.925926	95.921012	75.0	162.5	237.0	315.50	422.0
3	CCU	24.0	214.083333	76.748554	79.0	173.0	206.0	257.00	425.0
4	REFER TO OTHER HOSPITAL	10.0	286.900000	164.208167	114.0	195.0	266.5	308.00	714.0
5	CATH LAB	10.0	151.500000	24.649769	115.0	132.5	152.5	163.75	188.0
6	OT	3.0	284.666667	153.575172	174.0	197.0	220.0	340.00	460.0

1. Ward:

- Mean: 333.33 minutes, Min: 96 minutes, Max: 645 minutes
- TAT: 4 hours (240 minutes)
- 25th Percentile: 270 minutes, 50th Percentile: 318.5 minutes, 75th Percentile: 397.75 minutes
- Almost 87.5% of patients are moved late, exceeding the 4-hour TAT, with some patients waiting over 645 minutes.

2. Home:

- Mean: 294.15 minutes, Min: 160 minutes, Max: 495 minutes
- TAT: 2 hours (120 minutes)
- 25th Percentile: 230.5 minutes, 50th Percentile: 289 minutes, 75th Percentile: 348 minutes
- Every patient exceeds the TAT, highlighting significant delays in the discharge process.

3. Intensive Care Unit

- Mean: 238.93 minutes, Min: 75 minutes, Max: 422 minutes
- TAT: 2 hours (120 minutes)
- 25th Percentile: 162.5 minutes, 50th Percentile: 237 minutes, 75th Percentile: 315.5 minutes
- ICU transfers are often delayed, with 85% of patients waiting longer than the TAT.

4. Critical Care Unit

- Mean: 214.08 minutes, Min: 79 minutes, Max: 425 minutes
- TAT: 2 hours (120 minutes)
- 25th Percentile: 173 minutes, 50th Percentile: 206 minutes, 75th Percentile: 257 minutes
- Most CCU transfers face delays, with 87.5% exceeding the TAT.

5. Cath Lab

- Mean: 151.50 minutes, Min: 115 minutes, Max: 188 minutes
- TAT: 40 minutes
- 25th Percentile: 132.5 minutes, 50th Percentile: 152.5 minutes, 75th Percentile: 163.75 minutes
- 100% of patients experience delays in transfers to the Cath Lab, with transfer times significantly higher than the TAT.

6. Refer to Other Hospital

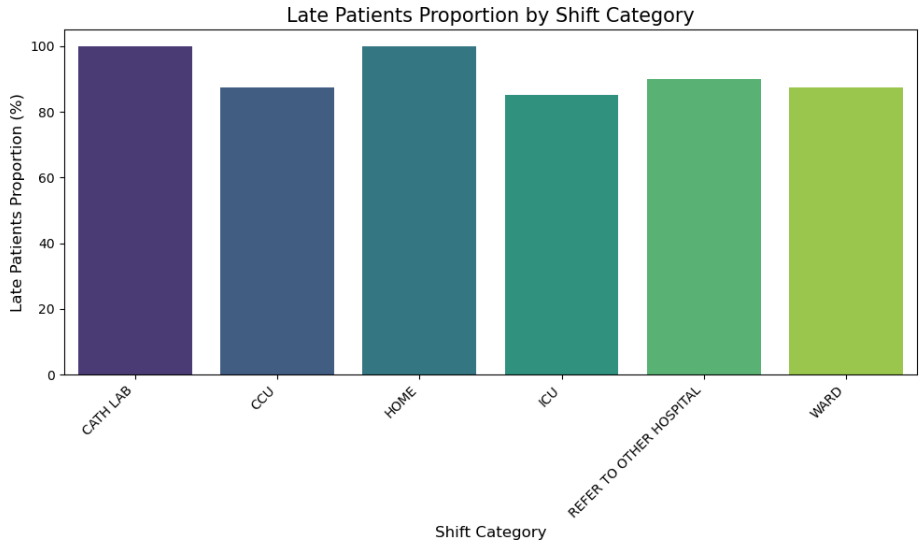
- Mean: 286.90 minutes, Min: 140 minutes, Max: 714 minutes
- TAT: 2 hours (120 minutes)

- 25th Percentile: 195 minutes, 50th Percentile: 266.5 minutes, 75th Percentile: 308 minutes
- 90% of patients transferred to other hospitals exceed the TAT.

Table 8: Evaluation of late patients based on shift category

	Shift Category	Late Patients Count	Late Patients Proportion (%)
0	CATH LAB	10	100.000000
1	CCU	21	87.500000
2	HOME	47	100.000000
3	ICU	23	85.185185
4	REFER TO OTHER HOSPITAL	9	90.000000
5	WARD	126	87.500000

Figure 9: Graph (%) late patients proportion based on shift category



1. Cath Lab (10 Patients)

- 100% were late in being shifted (TAT: 40 min).

2. CCU (24 Patients)

- 87.5% exceeded the 2-hour TAT for being shifted.

3. Home (47 Patients)

- 100% were shifted late, beyond the 2-hour TAT.

4. ICU (27 Patients)

- 85% were delayed beyond the 2-hour TAT.

5 Referring to Other Hospitals (10 Patients)

- 90% exceeded the 2-hour TAT. 6. Ward (144 Patients): a. 87.5% of patients exceeded the 4-hour TAT for shifting to Wards.

Conclusion and Recommendation

The data from the non-radiology section identifies multiple areas for possible improvement, particularly in delays in patient registration, specialty consultation, Diagnostic tests, and transfer of the patient. These factors contribute to long waiting times and increased frustration among patients. Such delays can have serious ramifications for patient outcomes, overall satisfaction of patients, and efficiency of the hospital which lead to loss of revenue and mismanagement of beds resources.

Key Observation

• Registration and specialty consultations- often take significantly longer than the turnaround time (TAT), especially during peak hours. This delay can lead to congestion in the flow of patients. Such delays occur, especially when patients need specialty consultations, particularly if the doctor is not available on the premises or takes more time to make the decision. As a result, patients may spend a longer time in the emergency department which further contributes to overcrowding issues.

• Transfers to wards, ICU, and CCU- see substantial delays, with the majority of patients experiencing waits far beyond the acceptable time limits. This delay primarily happens because of limited bed availability, poor coordination between the departments, and a slow discharge process for inpatients. This situation has a negative impact on patient outcomes, especially for critically ill patients or those who require urgent ICU beds or coronary cases.

• Cath Lab transfers- are a particular area of concern, with all patients experiencing delays. Cardiac emergencies are time-sensitive in nature, such delays lead to serious risks to the patient. Any delay in managing cardiac events can lead to increased mortality and morbidity. To improve patient outcomes, cardiac emergencies need to be prioritized, and clear communication to streamline the transfer process.

CHAPTER V:

DISCUSSION

5.1 Introduction

Previous section showcases, detailed results of the observations made about various points affecting the timeline the journey of patient. It also highlighted the correlations between different segments that help manage patient flow based on their needs. The present component focuses on analyzing the various factors that amount to the delays during the emergency room management of a patient, including registration, doctor evaluation, consultation, the radiology process, and the final movement of patients to the ward, ICU, home, or referral to another hospital.

5.2 Discussion Of Results

Will discuss the patient results who waited longer than the target admission time (TAT) and analyze the causes behind these delays.

The researcher points out several key areas of discuss based on the analysis of Radiology and Non-Radiology data.

(1) Delay in Registration Time

(2) Delay in Doctor Evaluation Time

(3) Delay in Specialty Consultation Time

(4) Delay in Discharge to Home or transferred to Ward/ICU

(5) Delay in Patient Movement from ER

(6) Delay in Initiating Tests in the Radiology Department

(7) Delay in Shifting the Patient to the Radiology Department

(8) Delay in Radiology Test Reporting Time

A comparative evaluation was made in this study to identify which of the above-mentioned aspects were the major contributors to the delay of patient management and their discharge from the ER

Delay in Registration Time

When patients arrive at the emergency room for immediate care, hospital policy requires them to register before treatment can begin. Without registration, the patient cannot be entered into the hospital system for record-keeping. The absence of a separate registration counter for the emergency department often leads to long queues, delaying patient care. Additionally, patient attendants sometimes block access points, creating further challenges for healthcare staff and disrupting the smooth transition of care.

Delay in Doctor Evaluation Time

The emergency doctor is responsible for attending to all patients who enter the emergency department. However, in some cases, patient attendants take longer to understand the situation or make decisions, causing delays in the treatment of other patients. When a doctor spends excessive time explaining the treatment plan to a patient's family, it reduces work efficiency, leaves less time for other emergency cases, and increases the staff workload. This can lead to overcrowding, and longer patient stays in the emergency department.

Delay in Specialty Consultation Time

Overcrowding and prolonged stays in the emergency room often occur when a patient requires a specialty consultation after being assessed by the emergency doctor. Delays can happen if specialty doctors are either not on duty or are occupied with other patients. Patients suffering from conditions such as stroke, brain injuries, and trauma require immediate specialty consultation for further treatment planning. As a result, they may have to wait longer in the emergency room, occupying beds that could be used for upcoming cases of emergency. This leads to overcrowding in the emergency room, which delays treatment of incoming patients.

Delay in Discharge to Home or transferred to Ward/ICU

In most cases where a specialty consultation is not required, the conclusion to admit or discharge a patient is made on time. However, delays occur when a specialty doctor’s opinion is needed based on pathology or radiology test results, leading to an extended stay in the emergency unit.

Delay in Patient Movement from ER

Several factors can delay a patient's movement within the hospital. Sometimes, the patient’s attendant or family may be confused about the treatment plan, taking longer to decide on admission or discharge. Discharge delays often occur due to the need for physician approvals and extensive paperwork. Additionally, nurses require time to explain the discharge summary and medications, causing further delays. Waiting for a final specialist consultation or pending reports can also prolong the patient's stay. A lack of coordination among hospital staff can

further contribute to these delays. If the inpatient ward is fully occupied and no patients are being discharged, the patient must wait longer in the emergency department.

Delay in Initiating Radiology Test

Due to overcrowding in the emergency, healthcare employees may sometimes forget to inform the radiology department about patient tests. Specialty consultations can also delay radiology, as specialists need to determine which test is most appropriate for diagnosing the patient. This lack of coordination between the emergency and radiology departments leads to delays in initiating tests, ultimately resulting in longer patient stays in the emergency department.

Delay in Shifting the Patient to the Radiology Department

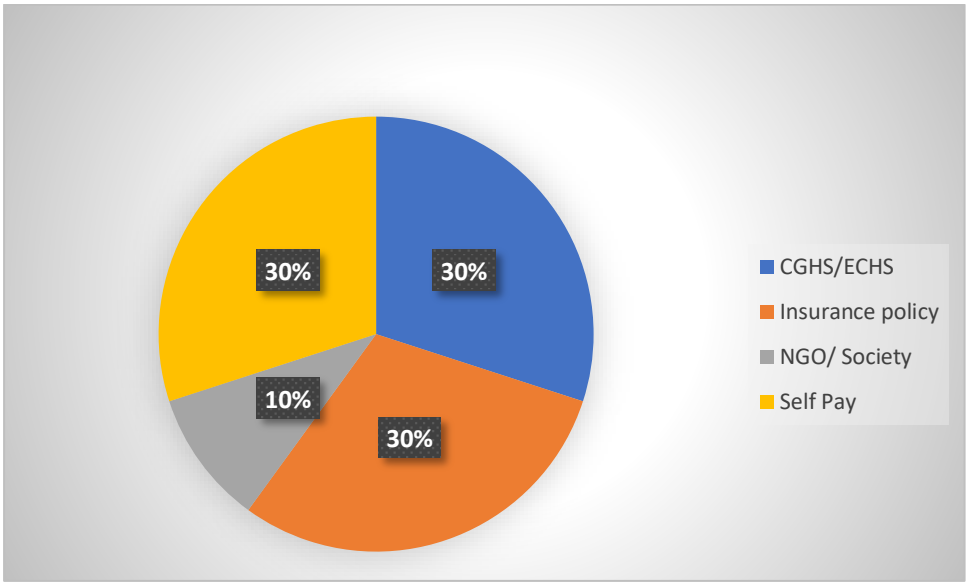
After initiation, the radiology department continues to experience delays in shifting patients due to a lack of Green Desk Assistance (GDA) and nurses. Sometimes, nurses are occupied with other patients or assisting doctors in transferring patients to the Cath lab or ICU, leading to delays in patient transfers to radiology. Additionally, a lack of wheelchairs or transfer beds contributes to these delays. The unavailability of radiology technicians and a shortage of doctors to conduct tests further exacerbate patient transfer delays to the radiology department.

Delay in Radiology Test Reporting Time

The radiology department primarily serves inpatients admitted to the ward/ICU, emergency trauma cases requiring immediate scans, outpatient department patients, and walk-in patients seeking specific scans, all of which contribute to delays in reporting time. Limited machine availability or equipment breakdowns can further slow down the process. A high patient volume in the radiology department often results in reporting delays, prolonging patient stays

in the emergency department. Patients must wait for their reports or a consultation with a doctor to determine the next steps in their treatment plan, which affects decisions regarding admission or discharge.

Figure10: (%) Population-based on category for getting treatment



Cause of overcrowding in the emergency department is a lack of available beds, particularly when patient numbers rise in departments with limited bed capacity. In Indian hospital settings, patient numbers in the emergency department are constantly increasing while available resources and healthcare services remain the same. Data shows that 20 emergency beds in the department accommodate 30,000 to 40,000 acute care patients annually, with the average boarding time for some patients exceeding 24 hours. A study conducted in Beijing reported similar findings, with some patients experiencing boarding times of more than 37 hours (82).

Delays in the discharge process of inpatients often lead to overcrowding in the emergency department, as patients expecting admission to the ward or ICU continue to occupy emergency beds. This results in long wait times for new patients arriving at the emergency room. Factors

contributing to the discharge delays include waiting for primary doctors' approvals, health insurance processing, handover of documentation to the patient's family, delays in counseling, and seasonal illnesses. These issues collectively lead to overcrowding, prolonged patient stays, and a shortage of emergency beds.

Secondly, patients requiring extended hospitalization for rehabilitation, support, or long-term care cannot be discharged if they lack adequate support at home or caregivers, especially the elderly. Additionally, hospital-impaneled organizations funded by the government often allow these patients to remain in the ward solely for nursing care, contributing to overcrowding in the emergency and blocking the admission of upcoming cases who need active management. A study found that 11.9% of patients were admitted to the emergency department for observation, resulting in an average stay of five days in the Beijing emergency department (82).

Patients who are awaiting admission, pending results of the tests ordered, and are under observation status in the emergency department can be challenging to balance and discharge. Additionally, some patients refuse admission to the inpatient ward, occupying emergency department resources and healthcare staff for extended periods. This reduces the department's capacity to handle new cases and increases the workload on healthcare staff. Emergency physicians and nursing staff are then required to manage more complex cases while also attending to patients under observation status.

Many critically ill patients refuse admission due to financial constraints. Not everyone has healthcare insurance, forcing patients to pay medical bills out of pocket. This financial burden creates significant pressure, especially when urgent care is required, leading patients to prolong their stay in the emergency department for illness stabilization or opt for cheaper options at other hospitals. Several patients with chronic diseases, organ failures, patients awaiting transplants, etc., require long-term specialized care, which is expensive, and these patients

require repeated visits to the ER for stabilization, thereby delaying attention to patients who actually require admission. In most countries around the world, emergency medical expenses are covered by the government. However, in India, patients must pay their healthcare bills by their pocket, which often leads to delays in the discharge process.

Third reason relates to the functioning of the emergency unit of the hospital and the overflow of non-urgent cases. Studies have shown that many patients with upper respiratory tract infections, particularly those without severe symptoms, seek treatment in the emergency department, even though such cases could be managed in outpatient clinics or day-care facilities. In general, there is no screening of patients before they enter the emergency room (ER), and therefore, any patient can enter the emergency department regardless of the severity of their illness. presence of nonserious patients in the ER puts additional pressure on healthcare workers. As a result, the emergency department is often labeled a ‘one-stop for all’ because it functions as a day clinic, medical ward, and nursing home, especially for elderly patients. Sometimes, the ER becomes an overflow area for the intensive care unit (ICU), where critically sick patients remain in emergency beds while awaiting an available ICU bed.

The fourth factor contributing to overcrowding in the emergency department is patient satisfaction. Hospital management often pressures emergency physicians to treat all patients, regardless of whether they require emergency care. This situation compromises access for patients who genuinely need urgent medical attention. Sometimes, patients demand treatments that are not appropriate for their condition, believing these treatments will help them feel better. For example, a patient with a pulmonary or chest infection, which could be treated in a day clinic with oral medication, may visit the emergency department and request IV fluids, even though it is unnecessary. They perceive the emergency department as a safer and more effective place for treatment, despite the availability of alternative care options. Many non-urgent cases arrive at the emergency department at night, adding to the strain on emergency services.

The fifth major factor contributing to overcrowding in the emergency department is the shifting of patients to other hospitals due to bed shortages or because some hospitals are not included in government panels, such as CGHS, ECHS, and ESI. This issue affects both patient care and hospital management. Healthcare staff spend more time coordinating patient transfers rather than attending to new patients in need of urgent treatment. As a result, physicians and nursing staff face increased workload and stress while patients awaiting transfer continue to utilize critical emergency resources such as oxygen and medication, which could otherwise be used for acute emergency cases.

Table 9 : Delay Discharge vs Ealy Discharge Advantage

EARLY DISCHARGE	DELAY DISCHARGE
Patient Satisfaction	Reduces the chance of again hospitalisation
Lower down the financial cost	Increases patient safety
Less risk of Hospital-acquired infection	Patient physician bond get more stronger
Early bed available to another patient	

Table 10: Delay Discharge vs Ealy Discharge Disadvantage

EARLY DISCHARGE	DELAY DISCHARGE
Early discharge leads to less recovery	Increases financial cost to patient
Increases revisit to emergency	Occupy bed leads to overcrowding
	Increases workload of health care staff

Hospital Management Inefficiencies

Table 11: Hospital Management Inefficiencies

Inappropriate Use Of Technology
Financial Shortage
Mismanaged Data
Procuring More Inventory
Ambulance Ramping
Inadequate Infrastructure

Hospital management inefficiencies are serious issues that impact the quality of care, low impact of finances, and utilization of resources. Few studies have reported different key areas which contribute to operational inefficiencies.

Inappropriate use of technologies is a concern in hospital settings, particularly with the Hospital information system (HIS), which is designed for managing patient data. Unfortunately, the underutilization of the technology impacts administrative tasks and operational efficiencies. A study found that 51% of physicians are unable to use the software effectively for optimal care of patients. Additionally, Physicians spend more than an hour on administrative tasks within the software instead of focusing on patient care (83). To improve this situation, hospitals can adopt better software and technology that streamline operational issues and administrative tasks. Monthly audits and feedback can reduce the problem between the IT workers and clinicians, fostering a better work environment. Furthermore, regular training program helps the physician to use the software efficiently.

Financial shortage and the allocation of resources can lead to operational issues. Sometimes management fails to understand the proper use of finances, which impacts patient care,

especially in the emergency department. Hospitals must prioritize emergency needs when setting budgets across various segments. This may include increasing staff, hiring general duty assistants, acquiring equipment such as wheelchairs, stretchers, ambulances, and beds as well as recruiting more physicians to tackle a high volume of emergencies. Additionally enhancing diagnostic labs helps in overcrowding and improves patient flow.

Mismanaged data can result in logistical delays and affect quality control. Procuring more inventory for the emergency department or within in hospital increases the cost of maintaining that inventory, along with the time and effort required from healthcare workers. In such cases, hospitals may restrict funds meant for inventory procurement, which could be utilized for other operational activities to achieve better outcomes.

Ambulance ramping can create a significant problem in patient care due to overcrowding in emergencies. When emergency beds are already occupied, patients cannot be shifted from ambulances to the emergency room. This situation prevents the transfer of patients to wards, ICUs, or homes, which in turn means the emergency department cannot take new patients. In this situation, the patient and healthcare staff are forced to wait in an ambulance, leading to further delays for other urgent calls. In Australia, this situation is referred to as “Ambulance Ramping,” which refers to the delay in offloading patients from stretchers (84). This resulted in overcrowding in emergency departments worldwide, resulting in a higher demand for ambulances and hampering hospital services. This situation impacts patient care, which contributes to dissatisfaction among both patients and healthcare providers. `

Inadequate infrastructure within the hospital impacts patient care, and lack of resources leads to delays in treatment and an increased risk of medical error. The emergency department faces challenges when there are insufficient beds or nonfunctional operating rooms, resulting in longer waiting times for patient admissions and affecting their care. Additionally, Old

equipment increases complications and medical errors, which prolongs the time required to stabilize patients. Furthermore, the layout of the hospital can create difficulties in moving the patients, contributing to additional delays.

The primary inefficiencies in hospital operations leading to patient discharge delays include staffing shortages, inefficient communication between departments, and limited bed availability. For instance, delays in radiology reporting significantly contribute to patient flow congestion, as indicated by the study's finding that 98% of patients experience wait times exceeding the recommended one-hour turnaround time. Studies on emergency department optimization suggest that **implementing real-time tracking systems** and **enhancing interdepartmental communication protocols** can reduce bottlenecks. Additionally, hospitals that have adopted **lean management principles**—such as **streamlined triage protocols and designated discharge lounges**—have reported faster patient turnover rates and improved staff efficiency (Smith et al., 2021) (85).

CHAPTER VI:

IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

6.1 Implications

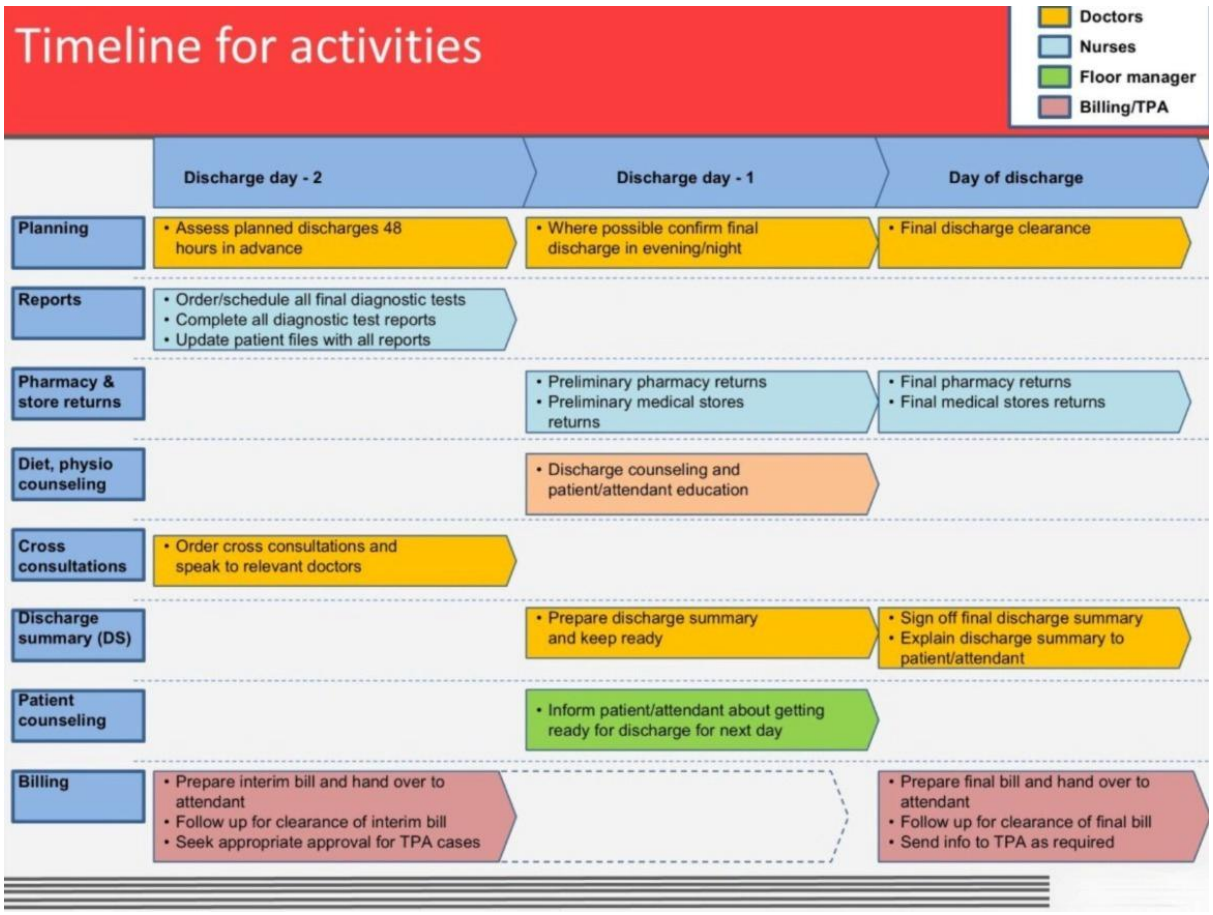
According to Haraden and Resar, the response to recognizing the delays in the emergency room is believed to lie in understanding flow of patients and addressing the underlying factors causing delays in timely care. (86). Overcrowding in the emergency department leads to delays. It has been shown by Han et al. to decrease patient satisfaction, patients leaving the emergency without seeing a doctor, increase pain of patient and suffering of family, and negatively impact of the quality care provided. Olsher and Rathlev observed that the not able to shift the emergency patients to inpatient wards or the lack of vacant emergency beds for new patients is the primary factor causing overcrowding in the emergency department (87).

To achieve a quicker turnover of the patients in the emergency room, it is essential to establish a clear discharge process for the inpatient ward. This will result in increased availability of beds in the inpatient segment, a faster allotment of beds to patients who need admission from the ER, help alleviate overcrowding in the emergency department, and facilitate a quicker transition for patients. The D-1 & D-0 counselling sessions should be organized in the ward to ensure a steady and fast discharge process. D-1 refers to the day before discharge and D-0 is the day of discharge itself.

During routine rounds by the doctors on the day prior(D-1), nursing staff should be informed about the patients who are planned for discharge. They can help with the process of billing, returning medication, and providing the discharge summary to the patient. The floor

coordinators should prepare a file for each discharged patient, which includes all reports of patients. Afterward, nursing staff can give a counselling session to explain the discharge process and clear all the pending financials before 12 pm of the next day to avoid delay. On D-0, after the doctor's round, the patient should be offered the final advice. After settling the bill, the financial department should give a quick clearance certificate before 12 pm. This will allow the room to be made available for the next patient who would be waiting in the emergency department. If this discharge process is religiously followed, more patients can be accommodated at a faster pace in the inpatient department, and a faster disposal of patients from the ER.

Figure 11: Timeline for activities for discharge



Discharge lounges play an crucial key role in the running of the hospital operations by accelerating patient turnover. A discharge lounge unit can be made either in the ward or the emergency department. Those patients are medically fit to go home from either ward or emergency but are waiting for their clearances, such as financial approvals, medications, discharge summary, counselling from nursing staff, or transportation arrangements, including ambulance, can be stationed here pending their final departure from the hospital. Such discharge lounges might help the management to take new patients, increase hospital turnover capacity, and accommodate more cases.

For patients who require extended rehabilitation and support care while being hospitalized. The hospital needs to plan separate units for long-term care that do not disturb the emergency services. This separate unit can include an occupational therapist, physiotherapist, and counselor to engage patients effectively. Hospitals can also tie up with home care set-up units to ensure continuity of patient care, rehabilitation, regular follow-up visits, and facilitating consultations with doctors as and when needed. Floor managers have to engage the family and patients for regular counseling and support sessions, as well as in developing home care plans and discussing recovery post-hospitalization and the ill effects of a long stay in the hospital. This engagement will motivate patients to be discharged from the hospital and help with bed occupancy for newer patients who need more acute care. Ultimately, this will increase patient satisfaction and enhance the revenue of the hospital.

Implementing an acute day outpatient clinic helps to minimize the load of patients in the emergency department. Setting up a day outpatient clinic for the categorization of patients with non-urgent problems such as headaches, back pain, upper respiratory tract infection, or seasonal flu. That can be treated in the outpatient clinic, and the emergency department can handle more critical patients, which helps increase the efficiency of the doctors, nurses, and other staff. The day-outpatient clinic, which can operate from 10 am to 6 pm should be

located near the emergency department. If patients need emergency services on an urgent basis, they can be transferred to the emergency department. The services offered in these acute care sections should include basic lab tests, ECG, blood gas analyzers, oxygen supplies, and nebulization, which will help the doctors treat such patients in an area different from the emergency, thereby leaving more beds available in the ER.

Appointments for day outpatient clinics can be booked online or through a call center, and physicians should also accommodate walk-in patients. Patient satisfaction can be improved in the emergency department while patients are taking treatment and waiting to be shifted to the ICU, ward, especially in the condition of overcrowding. This overcrowding in the emergency room is always stressful for physician, patient, and their families. In this case, providing patient satisfaction to the patient is a very tough task. It requires a lot of counseling, end-to-end communication from physicians and medical staff, emotional support, financial counseling, and streamlining the entire process to enhance patient flow and satisfaction.

In the ER, physicians must prioritize the patient category based on their condition, critically ill patient needs to be addressed first, redefining the patient status for urgent and nonurgent cases. Nonurgent cases can be redirected to a day-out clinic. Management should provide a counselor to the emergency department who can give a clear picture of the waiting time, counsel the family about the status, and provide support or engage in other facilities. Completing Pre-admission paperwork can help to reduce the further delay.

6.2 Limitations

The data collected for this study was limited to a single hospital which means that the findings cannot be extrapolated to every health care centre. Factors that contribute to emergency room delays in other hospitals may be different, including variations in bed sizes

of the hospital, the available range of medical facilities, the operation of the hospital, management approaches, and the allocation of healthcare staff per bed. Consequently, similar studies conducted in different hospitals are likely to provide different sets of results.

A limitation of descriptive statistical modeling is the time frame observed for each variable over the range of study, which may lead to incomplete capture of patient flow. Additional seasonal factors, such as a flu outbreak, might give different results. For future studies, it is advisable to consider a longer observation period to incorporate all the variables, including seasonal flu, trauma cases, and nighttime trends in the emergency department. To understand in a deeper way how hospital operations affect extended stay, it is to critically examine the engagement of nonemergency patients with emergency patients. For example, elective admission (which does not require emergency care), specialty consultation, and requests for diagnostic tests can all impact hospital resources.

Another important point to be noticed, the previous studies were run mostly in developed countries. Health situations are largely controlled by the volume of patients and demand for the services of the hospital; in developed countries, the structure of the emergency department is well-centered and fully funded by the government, which helps to overcome overcrowding. The population and the patient turnover in the ER thereof is much lower as compared to our country. Therefore, the results presented in this study may not react in the same manner as developed countries.

Further research should be directed towards comparative studies across multiple hospitals in both developing and developed countries and healthcare systems to identify factors affecting the performance of emergency departments.

6.3 Recommendations

Reducing waiting times and overcrowding in the emergency is very important for improving care and operational efficiencies.

Digital care, which provides health, plays an exceptional role in enhancing patient health management (88). Up coming years, patients primarily focus on controlling their health management. The healthcare industry is now shaping a new design where patients can experience new benefits and improved healthcare infrastructure, which includes improvement and effectiveness of managing healthcare units, reduced operating costs, and increased productivity of employees (89).

By adopting the new technologies, hospitals can implement real-time patient tracking, which helps manage bed availability and patient flow. This, in turn, reduces long stays in the emergency department.

The hospital's quality department can establish benchmarks for patient offloading, facilitating timely transfers from the ambulance to the emergency department. This improvement enhances the ambulance response time, allowing them to attend more calls for other patients.

Furthermore, diverting non-urgent cases to different care settings can reduce the traffic in the department. It is essential for the emergency to establish protocols distinguishing between urgent and nonurgent cases. While urgent cases should be prioritized, simultaneously nonurgent patients can be counseled on seeking care from local doctors, outpatient departments (OPDs), or other alternative care settings. By implementing this strategy, emergency departments can accommodate more patients, which reduces the waiting time and overcrowding.

By using these evidence-based strategies, hospital management can reduce waiting times and overcrowding, leading to better patient care outcomes and increased satisfaction. Additionally, this approach allows hospitals to utilize resources more effectively, thereby enhancing financial sustainability and reducing costs for patients.

Further research should be directed towards comparative studies across multiple hospitals in both developed and developing countries and healthcare systems to identify the factors affecting the performance of emergency departments.

6.4 Conclusion

A large proportion of the deficiencies that need improvement in the processes, as identified by the researchers, aimed at addressing the issues in the emergency room, which results in a prolonged stay and overflow of patients in the emergency room. Focusing on these emergency department challenges requires an accelerated towards to increase efficiency of the department, utilization beds, and enhance satisfaction.

Improving the Discharge process of the inpatient and establishing a discharge lounge can be helpful for patients and hospitals in vacating more beds and faster patient transfer from the ER. A simple process such as the regularization of the discharge process helps to free the inpatient on time to reduce the obstruction in patient flow. By effectively considering these processes, the hospital can achieve an enhanced patient count and maximize the utilization of beds in a manner that increases patient satisfaction, increases the growth of the hospital, and reduces the cost of services in the hospital of emergency unit. To manage emergency flow in a better way, the implementation of a Day out clinic can control overcrowding by treating

patients who don’t require emergency care. Patients who visit the emergency department for such conditions can be managed at the day clinic. By rerouting such patients, hospitals can improve emergency care services by providing emergency resources more effectively. Improving hospital operations through better coordination and clear communication would help to give a clearer picture of improvement or increase patient satisfaction.

Adequate staffing is also helpful in shifting and taking more patients to the emergency, providing smooth transfer to wards, ICU, home, or other hospitals, which reduces the waiting time of patients. Improvise radiology unit and diagnostic test can also be helpful in an emergency. The availability of radiology services 24 by7 and the automation of diagnostic tests can significantly help to reduce patient time. Classifying emergency patients based on their severity is also helpful in prioritizing the patients who need urgent care or immediate access to a bed.

From the hospital management point of view, the present study offers a methodology to help decision-makers, stakeholders, policymakers, emergency department administrators, and government authorities in designing a process to enhance patient turnover in the ER and a faster discharge of patients from the ER. Services like ambulance services needed by the patient to felicitate patient transfers to another hospital. Providing them with faster emergency care, assessing staffing policy, evaluating the stability which is correlated with demand and supply, and efficient distribution of work and hospital assets. By assessing the consequences of the above-mentioned interventions impacted the efficiency of the emergency of the hospital, we believe that we can improve patients' waiting time and offer them the best of care, thereby improving overall patient satisfaction at a given point.

APPENDIX A:

SURVEY COVER LETTER

This letter was sent to hospital management as a hard copy and email.

Disclaimer: The observational study is absolutely for educational purposes and maintains anonymity. No personal data was disclosed

Greetings,

My self Ms. **Vikas Dahiya**, I am a healthcare professional and DBA student at the Swiss School of Business Management in Geneva. **Study to evaluate the factors affecting delayed discharge/transfer of patients from the emergency room and its impact on patient volume**. To complete the study, data collection is an important part of my research work. All the patients who will be coming to the emergency department will participate in an observation for a limited time frame.

Throughout their Patient journey in the hospital, including registration for emergencies or treatment, the time until patients are either shifted or discharged will be monitored, which gives a comprehensive analysis. This will provide valuable insights for the hospital and can further help other centers in different hospitals.

Potential Benefits of the Research:

To Patient

Shorter waiting time in the emergency room provides several benefits for patients, which include:

- Increases patient satisfaction, which gives confidence to healthcare staff when treating the patient
- Prioritizing urgent care leads to a lower risk of medical errors.
- Timely emergency care prevents morbidity and mortality rates and provides better health outcomes.
- Less waiting time in the emergency will give result in reduce the stress and anxiety for both patients and families
- Prolonged hospital stays can increase the risk of hospital-acquired infection which can be handled by a fast turnover of patients.
- A shorter hospital stay reduces the costs for patients.
- Less waiting time helps patients with shifting and allocation of beds.

To The Doctor

- Reducing overcrowding in the emergency department gives confidence in the doctor for their decision-making and increases the efficiency of work.
- With fewer patients, doctors can give more attention or time to each individual, help in counseling, and make decisions more acutely.
- Less overcrowding increases interaction between patients and doctors, which helps in the initial assessment of the patient and helps in better diagnosis and treatment.
- A well-organised emergency department improves work coordination among the staff and increases job satisfaction.

- Less crowded environment, doctors and staff can utilize the resources efficiently without any delays.

To The Hospital

- Hospitals can manage more patients during emergencies if overcrowding is managed. Efficient operations in the emergency of the hospital can reduce the cost of patient stays and help to gain the revenue of the hospital.
- Shorter waiting times in an emergency are helpful to hospitals for patient trust and building a reputation in a healthcare environment.
- Less workload pressure on healthcare staff contributes to a happy environment, which helps the hospital to retain the staff for longer periods.
- Legal issues can be lowered when the emergency department operates smoothly.
- Less overcrowding increases the efficiency of operations which helps better turnover and patient flow.
- A well-organized emergency department can manage crises efficiently, like casualties, accidents, and seasonal flu outbreaks.
- Reducing waiting time helps the hospital to meet compliance and industry benchmarks.

I would thank the hospital for giving me this chance. Any concerns related to project, please contact me at vikas@ssbm.ch or message me on Linkedln.

Sincerely,

Ms. Vikas Dahiya

APPENDIX B:

INFORMED CONSENT

Before conducting the observational study in the hospital's emergency department, I informed the hospital management, Medical superintendent, and Head of the emergency department about my research which involved collecting data over 3-4 months during the daytime. The medical superintendent met me prior to the data collection to discuss the study and its potential benefits for hospital management and after this discussion, I have received permission to proceed.

The study will ensure that no patient’s identity, rights, or privacy will be disclosed. All rights of the patient are reserved.

Patient information, which includes name, sex, and age, will be collected anonymously, and all records will be securely stored to maintain confidentiality.

The research will involve passive observation in the emergency department processes and will not interfere with patient care and operational coordination of the department.

The purpose of the study will be informed in the emergency department, which help to collect the data and cooperation.

Research will follow hospital rules and regulations and will maintain the integrity of hospital operations and patient care.

After completing the data Hospital will provide the letter of completion (Attached)

APPENDIX C

Questionnaire / Observations in Emergency Room

Radiology Sheet

S.No
Study serial No.
Age
Sex
Time of Arrival in ER
Registration Time
ER Doctor Evaluation Time
Speciality Required Consult Time
Radiology Initiate Time
Shift to Radiology
Reporting Time
Discharge/ Admission Initiate Time From ER
Patient Moving Time From ER
Ward/ ICU/ Home/ Refer to Other Hospital

Non Radiology Sheet

S.No
Study serial No.
Age
Sex
Time of Arrival in ER
Registration Time
ER Doctor Evaluation Time
Speciality Required Consult Time
Discharge/ Admission Initiate Time From ER
Patient Moving Time From ER
Ward/ ICU/ Home/ Refer to Other Hospital

FEW SAMPLES OF DATA (RADIOLOGY SHEET)

S.NO	1
Study serial No.	001
AGE	67
SEX	Male
TIME OF ARRIVAL	8:04 AM
REGISTRATION	8:30 AM
ER DOCTOR EVALUATION TIME	8:10 AM
SPECIALITY REQUIRED CONSULT TIME	11:00 AM
RADIOLOGY INITIATE TIME	8:50 AM
SHIFT TO RADIOLOGY	9:20 AM
REPORTING TIME	10:40 AM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	10:10 AM
PATIENT MOVING TIME FROM ER	12:30 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	HOME

S.NO	2
Study serial No.	002
AGE	45
SEX	Male
TIME OF ARRIVAL	9:50 AM
REGISTRATION	10:30 AM
ER DOCTOR EVALUATION TIME	10:00 AM
SPECIALITY REQUIRED CONSULT TIME	12:30 PM
RADIOLOGY INITIATE TIME	1:30 PM
SHIFT TO RADIOLOGY	5:30 PM
REPORTING TIME	6:48 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	3:00 PM
PATIENT MOVING TIME FROM ER	7:20 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	WARD

S.NO	3
Study serial No.	003
AGE	85
SEX	FEMALE
TIME OF ARRIVAL	9:35 AM
REGISTRATION	10:00 AM
ER DOCTOR EVALUATION TIME	9:40 AM
SPECIALITY REQUIRED CONSULT TIME	11:20 AM
RADIOLOGY INITIATE TIME	10:10 AM
SHIFT TO RADIOLOGY	1:07 PM
REPORTING TIME	1:20 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	10:00 AM
PATIENT MOVING TIME FROM ER	3:00 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	ICU

S.NO	4
Study serial No.	004
AGE	50
SEX	FEMALE
TIME OF ARRIVAL	12:50 PM
REGISTRATION	1:20 PM
ER DOCTOR EVALUATION TIME	12:55 PM
SPECIALITY REQUIRED CONSULT TIME	1:16 PM
RADIOLOGY INITIATE TIME	1:30 PM
SHIFT TO RADIOLOGY	3:25 PM
REPORTING TIME	5:20 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	1:30 PM
PATIENT MOVING TIME FROM ER	7:50 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	WARD

FEW SAMPLES OF DATA (NON RADIOLOGY SHEET)

S.NO	1
Study serial No.	001
AGE	28
SEX	FEMALE
TIME OF ARRIVAL	10:40 AM
REGISTRATION	11:50 AM
ER DOCTOR EVALUATION TIME	10:50 AM
SPECIALITY REQUIRED CONSULT TIME	12:15 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	2:30 PM
PATIENT MOVING TIME FROM ER	4:30 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	HOME

S.NO	2
Study serial No.	002
AGE	65
SEX	Male
TIME OF ARRIVAL	1:35 PM
REGISTRATION	2:27 PM
ER DOCTOR EVALUATION TIME	1:40 PM
SPECIALITY REQUIRED CONSULT TIME	2:17 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	3:00 PM
PATIENT MOVING TIME FROM ER	4:00 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	CATH LAB

S.NO	3
Study serial No.	003
AGE	26
SEX	Male
TIME OF ARRIVAL	1:33 PM
REGISTRATION	2:00 PM
ER DOCTOR EVALUATION TIME	1:40 PM
SPECIALITY REQUIRED CONSULT TIME	2:00 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	2:10 PM
PATIENT MOVING TIME FROM ER	5:30 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	ICU

S.NO	4
Study serial No.	004
AGE	45
SEX	Male
TIME OF ARRIVAL	9:50 AM
REGISTRATION	10:30 AM
ER DOCTOR EVALUATION TIME	10:00 AM
SPECIALITY REQUIRED CONSULT TIME	12:30 PM
DISCHARGE / ADMISSION INITIATE TIME FROM ER	3:00 PM
PATIENT MOVING TIME FROM ER	7:20 PM
WARD/ ICU/ HOME/ REFER TO OTHER HOSPITAL	WARD

APPENDIX D

ETHICAL REVIEW APPLICATION FORM

Section 1: Applicant Details	
First Name	VIKAS
Last Name	DAHIYA
Faculty	Choose an item.
Co-researcher Names (internal and external) Please include names, institutions and roles. If there are no co-researchers, please state N/A.	N/A
Is this application for a staff or a student?	Student
Student Course details	Postgraduate Research
Name of Director of Studies / Supervisor	Prof. Atul Pati Tripathi
Comments from Director of Studies / Supervisor *For student applications, supervisors should ensure that all of the following are satisfied before the study begins:* • *The topic merits further research;* • *The student has the skills to carry out the research;* • *The participant information sheet is appropriate; and procedures for recruitment of research participants and obtained informed consent are appropriate.* *The supervisor must add comments here. Failure to do so will result in the application being returned*	
Click or tap here to enter text.	

Section 2: Project	
Section 2:1 Project details	
Full Project Title	
Study to Evaluate the Factors Affecting Delayed Discharge / Transfer of Patients from the Emergency Room and Its Impact on Patient Volume.	
Project Dates These are the dates for the overall project, which may be different to the dates of the field work and/or empirical work involving human participants.	
Project Start Date	16/03/2022
Project End Date	16/03/2025
Dates for work requiring ethical approval You must allow **at least 6 weeks** for an initial decision, plus additional time for any changes to be made.	
Start date for work requiring ethical approval	01/04/2023
End date for work requiring ethical approval	31/07/2024
How is the project funded? (e.g. externally, internally, self-funded, not funded – including scholarly activity) Please provide details.	
Self-funded	

Is external ethics approval needed for this research?	No
If Yes please provide the following: For NHS Research, please provide a copy of the letter from the HRA granting full approval for your project, together with a copy of your IRAS form and supporting documentation, including reference numbers. Where a review has taken place elsewhere (e.g., via another university or institution), please provide a copy of your ethics application, supporting documentation, and evidence of approval by the appropriate ethics committee.	
Click or tap here to enter text.	
Section 2:2 Project summary	
Please provide a concise summary of the project, including its aims, objectives and background. (maximum 400 words)	

Please describe in non-technical language what your research is about. Your summary should provide the committee with sufficient detail to understand the nature of the project, its rationale, and its ethical context.	
Study focuses to explore and identify the gap in the management patient flow in the emergency room of the hospital. It seeks to understand the factors contributing to overcrowding, increased waiting time, and delays in transferring patients from the emergency department. By addressing these factors, the study hopes by implementing intervention to reduce the stay of patient in emergency room which gives positive impact on healthcare system and overall outcomes of patients.	
What are the research questions the project aims to answer? (maximum 200 words)	
The project aims to answer the following - Time taken for registration of the patient - Time taken by ER doctor to see the patient - Time is taken by the ER doctor to decide whether the patient can be discharged or needs specialty consultation - Time taken by specialty doctor to attend to the emergency patient - Time taken for completion of prescribed diagnostic test - Time taken by specialty doctor to give final decision - Time taken for discharge or shifting of patient. -	
Please describe the research methodology for the project. (maximum 250 words)	
Research is presented as a descriptive study aimed at defining all the factors related to time management. The research is a quantitative retrospective study that includes the input-throughput-output model to evaluate the effect of patients' journeys in the emergency department. The study will assess potential delays from admission to discharge in emergency care. The findings of this study could significantly impact overall patient outcomes, as well as benefit healthcare physicians hospital staff, and Hospital management, ultimately affecting both the cost to the patients and the revenue for the hospital.	
Section 3: Human Participants	
Does the project involve human participants or their data? *If not, please proceed to Section 5: Data Collection, Storage, and Disposal; you do not need to complete sections 3-4.*	Yes
Section 3.1: Participant Selection	
Who are your participants?	

Any internet user across the Globe.	
Will you be recruiting students as research participants who are from outside your faculty and/or from multiple faculties? If you plan to recruit student participants from across UWE (rather than solely from your home faculty) your ethics application will be reviewed by UREC instead of the FREC.	No
Please explain the steps you will take to select your participant sample.	
There are no specific criteria, all the patients coming to the emergency department are considered in data.	
Please explain how you will determine the sample size.	
The sample size consisted approximately 250-300 patients who visited the emergency department. Please tell us if any of the participants in your sample are vulnerable or are potentially vulnerable, and explain why they need to be included in your sample. NB: Please do not feel that including vulnerable, or potentially vulnerable participants will be a bar to gaining ethical approval. Although there may be some circumstances where it is inappropriate to include certain participants, there are many projects that need to include vulnerable or potentially vulnerable participants in order to gain valuable research information. This particularly applies to projects where the aim of the research is to improve the quality of life for people in these groups. Vulnerable or potentially vulnerable participants that you **must** tell us about: • Children under 18 • Adults who are unable to give informed consent • Anyone who is seriously ill or has a terminal illness • Anyone in an emergency or critical situation • Anyone with a serious mental health issue that might impair their ability to consent, or cause the research to distress them • Young offenders and prisoners • Anyone with a relationship with the researcher(s) • The elderly	
N/A	
Section 3.2: Participant Recruitment and Inclusion	
How will you contact potential participants? Please select all that apply.	
☐ Advertisement ☐ Emails ☐ Face-to-face approach ☐ Post	

☐ Social media ☐ Telephone calls ☒ Other If Other, please specify: Patients who are visited in the emergency department are the potential participants for the data collection.
What recruitment information will you give potential participants? Please ensure that you include a copy of the initial information for participants with your application.
NA How will you gain informed written consent from the participants? Please ensure that you include a copy of the participant information sheet and consent form with your application.
Attached letter from the hospital medical superintendent and emergency head
What arrangements are in place for participants to withdraw from the study?
NA

Section 4: Human Tissue	
Does the project involve human tissue?	No
If you answer 'No' to the above question, please go to Section 5 Please describe the research methodology that you will use. This should include an explanation of why human tissue is required for the project and a description of the information that you and the research team will have access to about the participants/donors.	
Click or tap here to enter text.	
Please describe how you propose to obtain/collect, process, securely store and dispose of the human tissue.	
Click or tap here to enter text.	
Please explain if and how samples will be anonymised. Where samples are not anonymised, please explain how confidentiality will be maintained, including how this information will be securely and appropriately stored and disposed of.	
Click or tap here to enter text.	

Section 5: Data Collection, Storage and Disposal
Research undertaken at SSBM by staff and students must be GDPR compliant. guidance see

☒Please confirm that you have included the SSBM Privacy Notice with the Participant Information Sheet and Consent Form

☒ By ticking this box, I confirm that I have read the Data Protection Research Standard, understand my responsibilities as a researcher, and that my project has been designed in accordance with the Standard.

Section 5.1 Data Collection and Analysis

Which of these data collection methods will you be using? Please select all that apply.

☐ Interviews

☐ Questionnaires/Survey

☐ Focus groups

☒ Observation

☐ Secondary sources

☐ Clinical measurement

☐ Digital media

☐ Sample collection

☐ Other

If Other, please specify: Click or tap here to enter text.

Please ensure that you include a copy of the questionnaire/survey with your application.

What type of data will you be collecting?

☒ Quantitative data

☐ Qualitative data

Please describe the data analysis and data anonymization methods.

After collecting data from the emergency department, descriptive statistics to obtain the result. The data is secured and confidential and only used to evaluate the factors which help healthcare system in future,

Section 5.2 Data Storage, Access and Security

Where will you store the data? Please select all that apply.

☐ H:\ drive on UWE network

☐ Restricted folder on S:\ drive

☐ Restricted folder on UWE OneDrive

☒ Other (including secure physical storage)

If Other, please specify: Data will be stored on the researcher's secured physical drive and a backup on a secured cloud drive
Please explain who will have access to the data.
Researcher and mentee will look at the data, and Hospital management if they need data for their use.
Please describe how you will maintain the security of the data and, where applicable, how you will transfer data between co-researchers.
Data will be kept in a reserved with two-factor authentication enabled on the account. Any attempt at access will require a code from a device that only the researcher will possess.
Section 5.3 Data Disposal
Please explain when and how you will destroy personal data.
Patient data will be demolished one year after the date of collection the data or on request by the hospital, whichever is earlier. The data stored on the researchers' local drive will be scrubbed. The data stored on the cloud will be permanently deleted.

Section 6: Other Ethical Issues	
What risks, if any, do the participants (or donors, if your project involves human tissue) face in taking part in the project and how will you address these risks?	
There are no physical risks or care of the patient. Patients are only observed passively without any hindrance in emergency department. .	
Are there any potential risks to researchers and any other people as a consequence of undertaking this project that are greater than those encountered in normal day-to-day life?	
None	
How will the results of the project be reported and disseminated? Please select all that apply.	
☐ Peer reviewed journal ☐ Conference presentation ☐ Internal report ☒ Dissertation/thesis ☐ Written feedback to participants ☐ Presentation to participants ☐ Report to funders ☐ Digital media ☐ Other If Other, please specify: Click or tap here to enter text.	
Does the project involve research that may be considered to be security sensitive? For further information	No
Please provide details of the research that may be considered to be security sensitive.	

Click or tap here to enter text.	
Does the project involve conducting research overseas?	No
Have you received approval from your Head of Department/Associate Dean (RKE) and is there sufficient insurance in place for your research overseas?	Not applicable
Please provide details of any ethical issues which may arise from conducting research overseas and how you will address these.	
N/A	

Section 7: Supporting Documentation

Please ensure that you provide copies of all relevant documentation, otherwise the review of your application will be delayed. Relevant documentation should include a copy of:

- The research proposal or project design.
- The participant information sheet and consent form, including a UWE privacy notice. (if applicable)
- The questionnaire/survey.
- External ethics approval and any supporting documentation.

Please clearly label each document

Section 8: Declaration

☒ By ticking this box, I confirm that the information contained in this application, including any accompanying information is, to the best of my knowledge, complete and correct. I have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my obligations and the right of the participants.

Name: Ms. Vikas Dahiya
Date: 15/02/2025

APPENDIX E:
INFORMATION SHEET

Title	**Study to Evaluate the Factors Affecting Delayed Discharge / Transfer of Patients from the Emergency Room and Its Impact on Patient Volume.**
Coordinating Principal Investigator/ Principal Investigator	*MS. VIKAS DAHIYA*
Location	Geneva, Switzerland

Part 1 Engagement Overview?

Introduction

The researcher for this study observes the patients who visit the emergency room of the hospital for primary care throughout their stay.

There are specific questions related to the patient journey in the emergency department that are time-sensitive.

What is the research purpose?

Research is managed to evaluate study to evaluate the factors affecting delayed discharge/transfer of patients from the emergency room and its impact on patient volume.

The results of this study will be published. Ms. Vikas Dahiya will use these results to earn her Doctorate in Business Administration.

What does participating in this research entail??

The participants in this study are patients who visits emergency department for urgent care and will be included in the data collection process.

This research has been thoughtfully drafted that the researcher translate the results equitably and correctly, avoiding any hasty conclusions regarding the study.

No money associated with joining this initiative, and participants will not receive any payment for their involvement in project.

No funds related with participating in this research project. it only gives valuable insight that shape future understanding and practices.

Information about the study

The researcher will observe all the patients who visit the emergency department and track their time, which contributes to the delay in the emergency department.

Each patient will be observed separately, and the time spent tracking each factor involved in the process's delay, their information, and outcome will secure and private.

Primary researcher is Ms. Vikas and no assistant involved.

What are the possible benefits of taking part?

The researcher will identify the gaps that may provide the purpose of this research; however, after the research is published, you will have access to the paper which may provide additional insights to enhance hospital management and overall patient care.

What are the risks and disadvantages?

Possible disadvantages are only when the sample size is less or the researcher can not manage to track the time of all the questions, which is associated with patient-related journeys in the emergency department and can hamper the results.

What if I withdraw from the research project?

There is no possibility of withdrawing from the project. This study is an observational study which is conducted after the agreement of the Medical superintendent of the hospital and the Head of the emergency department of the hospital.

Is there a possibility that this research could be unexpectedly halted?

Chances of this research project coming to a standstill are low, ensuring that our progress remains steady and unwavering. Still some reasons are:

- insufficient patients
- The researcher determines that the paper is not important for society.
- The research supervisor concludes that the project lacks value or fails to benefit society.

What does the research project end?

once the research is completed, the researcher will contact you through your preferred method of communication to share a valuable insights and summary of the findings during the journey. The hospital will also have the authority to ask any kind of questions or request a copy of the dissertation from the researcher.

Research is expected to summerised around September 2024, and the researcher aims to finalize the dissertation by December 2024.

Part 2 How is the research project being conducted?

what will become of my information?

After the consent form, the Hospital grants permission to gather data from the emergency department and utilize medical information regarding patients for this research project. Any information collected during this observation will be held in the strictest confidence.

The data collected will be dedicated solely to this research and will not be shared or used in any future or parallel research initiatives.

The data collected will be reserved on a drive with a corresponding backup copy

We anticipates that the findings of this research project will be shared, published, and/or presented in various forums. Patients' confidentiality will be upheld by anonymizing all identities.

Under EU privacy laws and other relevant regulations, hospitals have the right to request access to the participant information collected and preserved by the researcher. Additionally, hospitals are entitled to request any correction to the information with which they disagree.

All data will be retained for one year from the date of collection or until the participant decides to withdraw from the research, whichever occurs first.

After publication of the dissertation, the researcher will ensure that all data is permanently deleted, honoring our commitment to privacy and ethics.

Complaints and compensation

If you have any concerns or complaints regarding the research or data collection process, we encourage you to reach out directly to the research supervisor or the institute . you will find the necessary contact information in the following section. Your feedback is valuable to us.

Any funding for the research?

This research is being self-funded part of the requirement for a Doctorate in Business Administration.

Who has reviewed the research project?

The ethical aspects of this research project have been approved by the Supervisor/Mentor of SSBM Geneva.

This statement is crafted to passionately advocate for the protection and well-being of individuals who agree to participate. your contributions are invaluable, and committed to ensure your rights and interest safeguard throughout the research process.

Further information and who to contact

The person you may need to contact will depend on the nature of your query. If you want any further information concerning this project or if you have any problems which may be related to your involvement in the project, you can contact the researcher on **+xx-xxx-xxx-xxx** or any of the following people:

Research contact person

Name	Ms. Vikas Dahiya
Position	Primary Researcher
Telephone	+91-8448246900
Email	Vksdh19@gmail.com , vikas@ssbm.ch

For matters relating to research at the site at which you are participating, the details of the local site complaints person are:

Complaints contact person

Name	Prof. Atul Pati Tripathi

Position	Supervisor
Telephone	
Email	*atulpati@ssbm.ch*

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Reviewing HREC approving this research and HREC Executive Officer details

Reviewing Supervisor/Mentor name	
HREC Executive Officer	
Email	

APPENDIX F:

FORM FOR WITHDRAWAL OF PARTICIPATION

Title	**Study to Evaluate the Factors Affecting Delayed Discharge / Transfer of Patients from the Emergency Room and Its Impact on Patient Volume.**
Coordinating Principal Investigator/ Principal Investigator	Ms. Vikas Dahiya
Location	*India*

Declaration by Participant

I would like to formally withdraw from participation in the research project. I fully understand that decision will not impacted any relationships with the researchers or the Swiss School of Business and Management. Thank you for the opportunity to be involved, and I wish you continued success with the project.

Name of Participant (please print) _____

Signature		Date	

In the event that the participant's decision to withdraw is communicated verbally, the Senior Researcher must provide a description of the circumstances below.

Declaration by Researcher[†]

I offered a clear and thorough verbal explanation regarding the implications of withdrawing from the research project, and I am confident that the participant fully comprehended this important information.

Name of Researcher (please print)	Ms. Vikas Dahiya		
Signature		Date	

[†] An appropriately qualified member of the research team must provide information concerning withdrawal from the research project.

Note: All parties signing the consent section must date their own signature.

APPENDIX G:

PERSONAL EXPERIENCE AND GROWTH FROM THIS STUDY

Starting my DBA journey was incredibly exciting. With over eight years of demonstrated success with management expertise in leading the healthcare business. I have developed protocols to resolve bottlenecks and improve workflow optimization with better utilization of resources. I completed my Bachelor of Occupational Therapy in 2005, followed by a Master's in Clinical Neuroscience from London. My experiences at Kingston Hospital equipped me with insight into hospital management and how to tackle crises. Upon returning to India I joined one of the Hospitals, from where I craved a project focused on addressing overcrowding in the emergency department.

As I delved deeper into research, I became more familiar with the emergency process, it no longer seemed intimidating but rather a worthy challenge.

The DBA journey introduced me to scholarly articles, periodicals, journals, and various theses, which opened up new sources of knowledge.

I also developed a habit of consistently writing and reading new medical journals that are related to hospital management.

Throughout this journey, I met many Doctors, and healthcare professionals, allowing me to share my insights and listen to their experiences in managing the emergency department. I made new connections with Doctors, healthcare staff, admin people, and upper management of the hospital. These interactions helped me realize that the management of the hospital faces similar challenges, particularly in addressing overcrowding or how to manage patient waiting time in an emergency. Together we discussed that what are the factors causing all these delays and sought some implementation for better outcomes.

Additionally, I learned the importance of listening. Observing patient's journeys and the behavior of staff during the busy period of the emergency department taught me patience while dealing with multiple patients. The significant transformation helped me become a better listener and observer.

overall, this journey gave me an experience, refining my skills and perspective both personally and professionally. it has provided me with lifelong growth and improved communication within the healthcare industry. I carry this journey with gratitude and a new perspective on my role in healthcare.

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TO WHOMSOEVER IT MAY CONCERN

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We wish to her all the best for her future endeavours.

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