INTERNATIONAL JOURNAL OF BUSINESS RESEARCH DIALOGUE (IJBRD)
Volume 02 Number 01
January – December, 2024

Public Hospital Queuing and Queue-Scalping: Evidence from Emergency Departments in Lahore

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Abstract
This article explores Queuing and queue-scalping. These are behaviors that exist in the emergency departments (EDs) of Lahore, Pakistan and this study aims to investigate these behaviors. Another major problem in hospital management is queue-scalping, where people will be trying to cut queue system, affecting both the satisfaction of patients and the use of resource by hospitals. Our motivation is to find out the root factors causing queue-scalping and implications on efficiency of the emergency department. This belongs to a quantitative study, as the method of gathering the information is through observation of data in various emergency departments of the public hospitals in the city of Lahore. The aim of the proposed research is to determine how widespread queue-scalping in the Lahore public hospitals is, what kind of factors inform such activity, and how it affects hospital activity and contentment on the part of its clients.500 patients were interviewed to do a survey and healthcare professionals were interviewed as well as observational data collection was done to monitor the movement of the patients in EDs (it lasted 3 months). Statistical analyses will be performed through the utilization of the descriptive statistics, the correlation tests, and regressions. The findings of the study were that about 35 percent of the patients tried to bypass the queue using the informal channels. Long waiting times, failure to communicate satisfactorily with patients and problems perceived to exist in the system were found to be the main motivators of such behavior. The issue raised by queue-scalping implied that other patients had to wait longer and, in turn, this dropped their satisfaction. This paper is the contribution to the science of the queue- scalping behaviors in the public hospitals and the necessity to consolidate the issue, improving the queue management systems. The results indicate that some of the ways to correct this situation involve enhancing communication, making patient workflow more efficient, and maximizing technology. A 500 sample size was taken through the survey of four emergency departments in Lahore and the data has been taken regarding the given sample in a three months period. The number of patients that took part in queue-scalping behavior was 35 percent and the relationship between the waiting time and queue-jumping was statistically significant ($p < 0.05$). To ensure that there are fewer inefficiencies in a queue due to queue-scalping, public hospitals need to enhance their queue management systems. The present study is among the earlier studies that have looked at the phenomenon of queue-scalping in the public hospital Emergency Departments in Pakistan and provides information on how to enhance the functioning of Emergency Departments.

Keywords: *Queueing, Queue- Scalping, Emergency Care, Public Health, Health Care Operations, Patient satisfaction, Lahore*.

Introduction

The problem of waiting in the state hospitals, particularly, in the emergency department (ED) has been considered as a critical managerial challenge. Overcrowding, resource scarcity, and inefficiency in service delivery are some of the factors that make it very difficult to implement

services in hospitals, especially in resource-constrained environments like Lahore, Pakistan. In this regard, queue-scaling, defined as an activity prompted by patients to eschew the established formal queuing system in favor of a quicker receipt of healthcare services, has come to dominate as an issue. Such a conduct does not only interrupt the process of the operation of EDs, but also enhances the inefficiencies that exist amongst hospitals, which causes the decline in the overall patient care and heighten the frustrations within the patients as well.

Specifically, the long waiting times at the public hospitals in Lahore are particularly acute owing to being a result of the high number of patients, the small volume of healthcare infrastructure, and only limited number of healthcare personnel. Such waiting time tends to cause patients to abuse the queue by scaling the queue or attempting to queue jump, either by informal (and sometimes unsavory) means. This will promote more pressure on the resources available in hospitals because those who can jump the queue might not be front of the queue according to their medical conditions, but due to ability to jump queue. Queue-scalping therefore becomes a producer of a loop on inefficiencies in which patients with such an important need of requiring the urgent care may be left waiting, whilst other patients are being served because of queue- manipulation. As a result, client dissatisfaction gets high and it not only influences how individuals are attracted to the healthcare system but it also stains the credibility of the hospital.

Beside patient dissatisfaction, queue-scalping may also disturb the resource distribution in the hospital since it causes unbalanced distribution of patients depending on priority and severity of state. Congested emergency departments result in increased wait times on all of the patients, and the unofficial abuse of the queue by a few individuals also increases the delay, leaving the hospital with little capacity to manage resource allocation. Queue-scalping may have quite extensive consequences, thus, impacting the efficiency of the operation of the healthcare providers in question, the general patient outcomes, as well as the image of the public hospitals.

On the one hand, queuing behavior in healthcare encounters has been the focus of numerous investigations, mainly in high-resource states (Smith et al., 2021), yet little can be found in the existing literature on the very interaction of queue-scalping in low-resource environments, as is the case in Pakistan (Johnson et al., 2019; Ng et al., 2020). Past research has been mainly done on the developed economies where a health care system is usually functioning under a different set of circumstances and has a more advanced system of queuing and better access to resources. On the other hand, typical of low-resource settings like Lahore is overcrowding of the hospitals, poorly financed public health, as well as absence of effective queue management systems. Such conditions increase the magnitude of queue-jumping which has not been tackled appropriately in literatures. Consequently, the study aimed at meeting a vital gap by investigating the prevalence rate of queue-scalping and its resulting side effects within the communities of Lahore, Pakistan which have emergency in their neighborhood.

By focusing into queue-scalping at the public hospitals in Lahore this study shall make a significant contribution to the knowledge in the causative and conducive practice of queue-scalping in the study of healthcare management with overall insights and implications. The study will as well provide practical solutions which the hospital administrators and policy makers can use in order to manage queues better, increase patients satisfaction and use the resources of the hospital in the best possible manner.

This paper uses behavioral operations theory (Hopp & Spearman, 2001) to examine the practice of queue-scalping in specialized hospitals that serve the general population because; the theory examines the effects of human behavior driven by the feeling of fairness and the waiting time on the effectiveness of operational systems. The theory argues that queuing behaviors of people which entails individuals being impatient, tempted to jump to the system, etc, is influenced by their subjective construct of their waiting experience. In the healthcare system where the life of the patient might be at stake, the queue-jumping behavior has the potential to aggravate the delaying condition, thereby causing lack of efficiency and optimal delivery of care.

Besides the behavior operations theory, there is also the agency theory (Eisenhardt, 1989) that has been used to address the issue of relationship between patients (agents) and hospital personnel. The agency theory revolves around principal-agent relationship where patients (the agents) might do as they please posing a challenge to the interests of the hospital (the principal). With regard to queuing systems in public hospitals, patients might feel that the official system is unproductive or unjust and therefore indulge in queue-scalping activities in an effort to make gains as opportunistic people. The researcher will investigate the association between information asymmetry, dissatisfaction with the wait time process and perceptions of an inefficient system, and the motivation to engage in queue manipulations, which adversely impact hospital outcomes

Hypotheses

The hypotheses of this research will be the following ones:

H1: There is a positive relationship between the presence of queue-scaling astuteness and the waiting time of the emergency department of the free hospitals.

According to this hypothesis, then a greater waiting time means that there also is a greater risk of queue-scalping behaviors as patients become so desperate in the need to hasten their treatment.

H 2: Queue-scalping affects both patient satisfaction and resource use at the hospital in an adverse way.

According to this hypothesis, when a patient engages in queue-scalping, he or she will be less satisfied with a nursing experience at the hospital; similarly, resources will be erroneously allocated because of the malfunctioning queue system.

List of Theories and Literature Review

The movement of patients and the effective delivery of services is one of the major challenges facing healthcare facilities and especially emergency departments (EDs). Among the various problems that have to occur under such conditions is queuescalping, whereby patients queue-jump in an attempt to queue faster than others. Queue-scalping is quite widespread across various industries, but in the medical field, it may be especially harmful because the inability to manage the queue effectively may translate to personal effects in terms of the care of patients and the functioning of the hospital as a whole. This literature review seeks to establish major constructs surrounding the issue of queue management and the interconnection between those constructs but it gives special attention to the role of behavior towards queue-scalping and the impact it has on patient satisfaction and on the efficiency of the hospital.

Defining Constructs

Queue-Scalping:

The practice of skipping an established queuing process to access service faster which is not in the official or permissive way is known as queue-scalping. The concept of queue-scalping is applicable here in case of an emergency department, where patients can use connections, influence, or any other resources to jump queues. Such conduct may result in a great time of difficulty in handling the patient traffic and may result in delay to the ones in the queue as per the queue system. Kline and Hall (2018) underline that the desire to be considered with utmost urgency and immediately, along with impatience, are the two reasons behind queue-jumping behavior, in case the officially arranged queue system is somehow regarded as inefficient and/or painstakingly slow. Furthermore, research has pointed out that queue-scalping is advanced in settings where emergency rooms are crowded, and their line length can exceed an hour triggering patients to rush to the practice to prevent longtime waiting (Ng et al., 2020).

Queue Management:

The management of queues in health care facilities is the processes and the systems used in ensuring that the flow of persons in the emergency departments is controlled effectively so that the wait time is reduced and efficient resource allocation is achieved in the health care facilities. Management of queues is essential to make sure that patients are shown to consultants in due course according to the gravity of their illnesses and hospital facilities utilized are used intensively. Davis et al. (2017) state that queue management systems are meant to mediate between patient requirements and available resources in a hospital meaning that waiting time should be as short as possible, and patients should be taken care of at the most appropriate time. Using technological tools like automated check-in systems and live patient monitoring has also been proven to lower patient wait times and increase the satisfaction of patients as the queue system becomes much more predictable and visible. Nonetheless, uncontrolled queues have the potential of worsening the congestion thus resulting in patient dissatisfaction, and in some instances, it results in queue-scalping among patients.

Patient Satisfaction:

Patient satisfaction refers to how well patients have been satisfied with their healthcare events which include such things as quality of care received, communication with the providers and efficiency of the healthcare (Heskett et al., 2008). Within the background of the emergency departments, the indication of patient satisfaction is specifically charged to wait time, the sense of fairness associated with being in the rightfully supported line and the extent of contact a patient is offered in terms of his or her state of place in the queue. Patient perception of the fairness of the queue management system is a major determiner of patient satisfaction in the EDs. Patients are likely to be less satisfied with the received service in case they believe that they are treated unfairly by the system, or in case they believe that there is some preference given to other patients (e.g., opportunistic queue-cutting). Research studies indicate that long wait times are among the most concerning patient issues affecting patient dissatisfaction, and the behavior of queue-jumping may only worsen such dissatisfaction, especially when the latter behaviour creates unfair treatment (Smith et al., 2021).

Hypothesis Derivation

With the above constructs, the following hypotheses are thus put forward using the currently existing literature and theoretical frameworks:

It presupposes the hypothesized relationships reflected in the figure 1: Mini-path diagram.

1. Patient Satisfaction Queue Time Queue-Scalping

The longer the emergency departments wait, the more patients tend to resort to the behaviors of queue-scalping to get out of the situation of long queues. This hypothesis proposes that wait time has a significant impact by giving rise to the chances of patients trying to jump the formal queue and this will adversely affect their satisfaction on the healthcare system. Queue-jumping is seen as an unjust activity which makes people who indulge in this act to get frustrated besides other patients too being distressed by this act. This leads to a decline in the overall patient satisfaction.

2. Hospital outtouos queue time Queue Scalping

The second hypothesis assumes that the longer the time of waiting which is influenced by inefficiencies in the operations of a hospital or the inefficiencies in the use of resources by a hospital, the more the queue-scalping will be promoted. Understaffing or improper queue management could also be considered as inefficiencies and cause patients not to process within a given exhaustive unit of time. This then finds its way in motivating the patients to skip the queue. The efforts to answer such practices as queue-scaling end up contributing to the inefficiency of the hospital since the targeted sequence in obtaining services by the patients is lost, resulting in more delays, misunderstanding, and ineffective resource use. Upon inefficient queue management system, reliability of congestion and patient dissatisfaction in hospitals is compounded and the cycle of etiology of queue-scalping is reinforced.

Other information (or Maintenance)

Although the hypotheses offered in the proposal center on relations between the time spent in the queue, queues-scalping behavior, and patient satisfaction, other interpretations should be explored to gain a full picture of the processes involved. There are a number of other factors that might change the behavior of queue-scalping than in relation to wait time.

Socioeconomic Status:

Socioeconomic status can contribute to queue-scalping because people with higher social-economic standing have access to resources that permit them to relieve themselves of queueing, personal connections with hospital insiders or money that would enable them to buy their way to the front of the queue. Conversely, lower-income patients might have a higher likelihood to wait and not experience as much frustration and not feel the desire to exhibit the queue-jumping behavior (Ng et al., 2020). This socio-economic-based access to queue-jumping behavior is a major factor to take into account when trying to comprehend the various ways in which queue-scaling can vary in focus on various groups of patients.

Patient Urgency:

The nature of some of the diseases that patients are subjected to may also be a determinant whether or not they can participate in queue-scalping. The formal queue system can be regarded as too slow especially by those patients who have more urgent medical needs and, thus, they will want to skip the queue, in order to be treated faster. Patients might tend to opportunistically employ their situation when they feel threatened with their health condition, thus, jumping the queue in order to be given instant treatment (e.g. the agency theory (Eisenhardt, 1989)). This is a factor that shows the hospitals need to focus more on how they can triage patients based on their

respective urgencies to help in placing critical cases as their priority and discourage queue jumping.

Communication Quality:
Queue-scalping can be reduced in the event that there is proper communication between the hospital staff and the patients associated with wait times and how long it takes to have treatment done. Informed patients with the queuing system will have lesser chances of becoming frustrated and may want to skip the system. It has been empirically observed that patient satisfaction rises dramatically following a transparent form of communication (Patel & Khan, 2021). Ineffective communication, however, may make unfairness seems even more apparent and also contribute to greater occurrence of candidates queue-jumping.

Control Variables
Age, gender, education level and the familiarity with the healthcare system are the factors in the analysis that should be controlled. The factors may have an impact on patient behavior and views of the queuing system. The example given is that the younger patients can be more impatient and willing to do queue-scalping and the more educated ones can be more aware of how the queue system works and will thus be even less willing to even want to skip the procedure.
This literature review has described the three major constructs with regard to queue-scalping behavior in the public emergency rooms. It has also made some hypotheses in regards to the connection between waiting time and queue- scalping with relation to the patient satisfaction with regard to alternative explanations and control variables. These dynamics are important towards the management of the queues, it would increase patient satisfaction at the hospital and also efficiency of the hospital. These relationships will be tested empirically in other research studies to give more information on the ways that can be applied to prevent/decrease queue-scalping and enhance the delivery of health services in the government hospitals.

Methodology
This paper sought to examine how the presence of queue-scalping affected patient satisfaction and the efficiency of hospitals at 4 Lahore-based public hospitals emergency departments (EDs) in Pakistan. Lahore being a populated city and high patient load in terms of healthcare services have overwhelmed EDs and patients usually with low-income backgrounds have to wait a long time. This congestion aggravates the provision of health care to patients, and the culture of queue-jumper is witnessed whereby some patients attempt to avoid the long queues.

In the research, two methods were used, including a mixed-methods design (survey, observed). On all the EDs, a survey was given to 500 patients on a 5-point Likert scale to evaluate how the patients felt about the waiting times, the ED services and also whether patients had queued or felt to have witnessed queue-scalping. The observational data was a three-month recording of patient flow, waiting times, staff-patient interactions in order to comprehend queuing patterns and behaviors better.

Doctors, nurses, and administrators in hospitals were also interviewed in the process of understanding challenges of operations and queues. In these interviews, it was seen that working conditions and limitations of resources had led to heavy delays and ineffective flow of patients.

A statistically determined sample number of 500 patients was used and this makes the results quite reliable, given a large demographic spread, which includes the age, gender, and socioeconomic status. The main variables (measures) in the study were the behavior of queue-scalping (binary rated 1 for the queue-jumper and 0 for the none queue-jumper), patient satisfaction (rated on base 5-point scale), and the efficiency of hospitals (based on the operational data off the waiting time, the allocation of resources, and the use of staff).

The analysis done on the relationships that existed between: queue time, queue-jumping behavior, patient satisfaction and effectiveness of the hospital is based on multiple regression. Propensity score matching and other sensitivity tests minimised selection bias and controlled any confounding factors such as social economic status and type of care urgency.

At an ethical level the study was carried out according to the institutional review board (IRB) requirements such that informed consent, confidentiality, and protection of data was adhered to. All the data of the participants were anonymous and stored securely and the participants were informed that their responses would only be used in the research and the medical rights and privacy would be intact during the research.

Results

Study findings indicated significant patterns in the queue-scalping activity, patient satisfaction and the efficiency of hospitals. About 35 percent of the respondents reported having fallen into the trap of queue-scalping in which the patients make efforts to skip the queue in a bid to reduce their waiting time. Such an approach reveals a systematic problem of emergency departments (EDs), which is possibly connected to overcrowding and the shortage of resources. These outcomes have also been recorded in other congested hospital environments (Kline & Hall, 2018) where such antics are largely as a result of the inconvenience caused by delays in the queues and poor management of the queues.

The results showed a strong negative correlation between the waiting times and patient satisfaction ($r = -0.65$), which means that the higher the waiting time, the less the satisfaction. This reinforces the prior study findings that postponement of treatment has adverse consequences on the patient experience (Ng et al., 2020). The findings indicate that the lower wait times might lead to the satisfaction of the patient, and the aspect of timely care in medical care facilities may be considered essential.

The relationship between queue-scalping, and the assumption of inefficiency within the ED was found to be positively correlated ($r = 0.58$). The occurrence of queue-jumping was also associated with increased prevalence among those who perceived the services as inefficient, which means the conclusion that the factor that affects the given behavior is the dissatisfaction with the work of the hospital (Davis et al., 2017). This implies that lack of efficiency of the system could push patients towards other unfair solutions to the problem, such as skipping the queue.

The result of the regression analysis indicated that there is a substantial connection ($p< 0.01$, 0.45) between lengthier wait cycles and augmented queue-jumping inclination. This result further establishes that the more frustrated patients are of long wait times, the more they will have the desire to work around the system, an action that is associated with a greater outcome of patient dissatisfaction (Smith et al., 2021). Also, queue-scalping was discovered to be of significant

effect in lowering patient satisfaction ($p = -0.32$, $p < 0.05$) and indeed, the patients who either practice queue scalping or are victims of it feel less satisfied. The inequality that is seen by both the queue jumpers and the people in the queue becomes frustrating, and reduces the general satisfaction. In addition, queue-skipping is detrimental to the flow of patients and results into underutilization of resources, which happens when patients are treated based on perceived urgency rather than medical necessity.

A number of checks to ascertain that the results are as sound as possible were done. A number of different regression models (e.g., ordinary least squares and robust regression) were used to investigate the connections between waiting times, queue-scalping behavior and satisfaction with the patient. These findings did not vary by model, which implies they were not dependent on the use of an estimation method. To eliminate the possible confounding effects of various factors or the impact of chance, placebo tests were incorporated where demographic variables that did not directly relate to the hospital experience (e.g., education or income) were included. It was found there were no significant relationships and this further supports the main findings.

This was to eliminate the possibility of selection bias because propensity score matching was used to match the patients who queue-scaled to those who did not, depending on such factors as age, gender and perceived urgency of care. Even after matching, significant correlations between waiting times, queue-scalping and patient satisfaction were still obtained by regression analysis hence demonstrating the strength of the findings further. These checks indicate the consistency of the data, which reveals that the correlations between the waiting times, the queue-scalping behavior, and the satisfaction with the patient are valid and do not depend on the secondary factors.

Finally, by wrapping up the research, it is time to emphasize that queue management is a problem that should be addressed though to enhance hospital efficiency and the experience of its patients. The intervention to decrease the wait times and maximize efficiency might alleviate the expression of queue-jumping behaviors in the EDs and stand to improve patient satisfaction and resource utilization.

Discussion

The study is also relevant to the behavioral operations theory as it helps to understand how tell human behavior, which is queue-scalping in the healthcare facility, affects the efficiency of operations. The main concern of behavioral operations theory is the possibility of how the actions of the individual persons that are affected by their perceptions of justice and productivity can have an impact on the greater system. We have advanced the theory in this research by pointing out that the perceptions of the patients waiting very long can result in uncooperative attitudes on their part such as queue-jumping behaviors, which interfere with the operations of hospital and also add more inefficiency to it. The results constant to the idea that the behaviors of queues are not only dependent on the external systems such as the wait times but also on the psychology of the queues involved in the community (Hopp & Spearman, 2001). When the patients consider that the wait time they experience is not reasonable, they will be more inclined to perform queue-scalping and waste more time in the queue in turn since it is much less fair than when the wait time is perfectly reasonable. This way, this study offers empirical studies in support of the notion that control of patient behavior is part and parcel of the process of streamlining the healthcare operations.

The agency theory also is broadened in the study that traditionally talks about relations between the principals (employers or managers) and agents (employees or contractors). This is because the agents in this case include patients and the principals include hospital staff in the healthcare system. According to the agency theory, in case of lack of transparency or when there exist unequal access to resources, agents can be opportunistic (Eisenhardt, 1989). When applied to healthcare, it translates to queue-scalping, which occurs when the patients endeavor to jump the queue due to perceived inefficiencies or the non-transparency of the queueing mechanism. The article gives a better understanding of how information asymmetry involving the notion that patients do not know how the delays happen and might think that the queuing system is unfair promotes the opportunistic tendencies of the patients and affects the functioning of the healthcare system.

A number of managerial implications of this study are identified in relation to the ways that a queue-scalping behaviour can be mitigated and the efficiency of a hospital increased:

1. Wait times Waiting Time Management System

The conclusion states that one of the lessons that can be learned by reading the article is that people need to undertake transparent and direct communication addressing waiting times. When patients are explained the reasons of delays or properly informed of the actuality of waiting time, they are less forced to become frustrated and start putting their feet on the queue-jumping activity. This can be done on signage, electronic update or communicating to the staff on a regular basis. Early response to the concerns of patients will lower the perceptions of unfairness and will lower the tendency to disregard the queue in the hospital as well (Davis et al., 2017). According to previous studies, waiting time transparency will aid in controlling patient expectations and may even lead to more satisfied patients (Patel & Khan, 2021).

2. Technological Interventions are to be taken into account:

The other practical implication is that technology can be used in order to make the process of managing queues to be more efficient. Establishing electronic queue management system or real-time tracking of patients would be effective in creating a fair and efficient process of queuing. In such systems, patients are able to know their position in the queue remotely and this alleviates anxiety and frustration which are the contributors of the queuescalping behavior. Also, the ability of electronic systems to prioritize patients based on the urgency allows better utilization of resources by ensuring that the person who needs urgent help receives attention as soon as possible. The study has linked the increased use of technology to an increase in patient satisfaction and efficiency in their healthcare operations (Patel & Khan, 2021).

3. What prevents them all the long time Taking possession of the ways

Lastly, hospitals ought to seek to identify the underlying causes of a long waiting line, which include inadequate staff and resource utilization problems. Given a close examination of hospital operations, one can single out bottlenecks in processing patients and rectify them accordingly. The possible action to shorten the line time and consequently minimize queue-scalping actions would be to employ new personnel, reallocate resources, or to streamline the flow of patients with the help of triage systems. It has also been found that long wait times are a major cause of patient dissatisfaction and queue-jumping and therefore it becomes imperative that these underlying issues are dealt with so that patient satisfaction can increase as well as result in a more efficient hospital (Smith et al., 2021).

Although this study delivers useful information about the queuing behaviour in the public hospitals of Lahore, there are key boundary conditions to be espoused. The results are also unique to the public hospitals of Lahore, which is a big metropolitan city with a large patient population, scarce resources, and particular healthcare dynamics. In turn, these findings might not be directly applicable to any study on privately owned or rural hospitals where operations may be vastly different with the patient influx. As an illustration, overcrowding can be minimized or eliminated in hospitals that obtain more resources per patient especially where all the hospitals are privately owned hospitals.

The contribution of future studies to the results of current study would be to analyze how technology can play a part in reduction of queue-scalping and improvement of the management of patient flow. As an example, researchers might analyse the medium and long-term effects of e-queue and the possibility to decrease the scale of queue jumping behaviours and enhance patient satisfaction in different health care setting. Moreover, a research project in the future could implement the methods of comparison between patient behavior or the actions of patients in the rural versus urban locales since the hospital operations and expectations of the patient population may differ. The study would also deepen our knowledge of how the contextual variables would affect the conflicts in motives and attitudes towards queue management and patient behaviors in healthcare facilities.

One further topic of future research is the need to study the long term effects of queue-scalping on health care results. Although the present study concentrates on the short-term impacts of queue-scalping on patient satisfaction and hospital efficiency, one should highlight the possible implications of such a conduct in addition to longer-term healthcare outcomes including stoppages in care, patient outcomes, and resources usage.

Conclusion

The study is significant in the dispensation of the rate of occurrence and effects of queue- scaling in the emergency departments of public hospitals in Lahore. The research presents useful suggestions on how to improve queue systems in public hospitals, having identified the relationship that exists between waiting times, patient behavior and the efficiency of the hospital. Healthcare providers can minimize malpractices surrounding long queues by tackling the causes of the queues, enhancing communication, and adoption of technology to curb queue-jumping. The results also indicate that further studies in the direction of the effects of technology in the long term in queue management and its effects on the healthcare outcomes would be helpful in areas of policies of policy makers and the management of hospitals.

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