

Research title

إدارة قسم الطوارئ: استراتيجيات لتقليل أوقات انتظار المرضى

**Emergency department administration: strategies to
reduce patient waiting times**

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Introduction

Emergency Department (EDS) is an essential component of healthcare systems globally, providing immediate and life-saving medical services. A frequent challenge faced by emergency departments has long been waiting for the patient, resulting in an increase in congestion, an increase in patient dissatisfaction, and potentially deteriorating clinical consequences (Purnell, 1995). Prolonged waiting time disrupts effective patient care and puts more stress on healthcare providers, increases the possibility of burnout and reduces the overall quality of service (Finamore & Turris, 2009).

In emergency departments, long waiting time is attributed to a variety of internal and external factors. Internal factors including disabled triage processes, lack of staff, and insufficient resource allocation are significant contributors (Medeiros, 2016). External factors, such as growing patient growth from population growth, restricted in-postage bed availability, and delay in specialist consultations, intensify the issue (Willoughby, Chan, & Strenger, 2010).

Several strategies have been suggested to reduce waiting time in emergency departments. Research has examined the application of patient-focused care models which prefer enhanced communication between healthcare providers and patients for adaptation of care process (Alhabib, Almutairi, & Alqurashi, 2024). Operating efficiency techniques, including lean management and queuing principles, have been used to enhance workflow and resource usage (Cantero & Redondo, 2014). Additional interventions include reconstitution work changes to match the influx of peak patients and apply dynamic queue management systems that adapt to real-time resources (Sinreich, Jabali, & Dellaert, 2012).

It is not only important for the patient's convenience to address the long wait time, but also due to evidence that extended delays can result in negative health results, such as sickness and mortality in severely sick patients (Daldoul et al., 2018). It is necessary for ED administrators to improve efficiency, improve the patient's satisfaction and adopt evidence-based strategies to optimize healthcare delivery.

Emergency Department (EDS) serves as an important element of health care systems, which serve as the starting point of contact for patients with immediate medical care. prolonged waiting time presents a great challenge in many emergency departments globally, resulting in a negative effect on patient care and hospital efficiency (Purnell, 1995).

It is necessary to address the patient's waiting time due to its direct effect on health results. Delay in medical care can cause health conditions to deteriorate, high mortality, and complications that could prevent timely (Alhabib, Almutairi, & Alqurashi, 2024). Additionally, extended waiting time gives rise to patient dissatisfaction, and potentially low trust in healthcare providers and institutions (Finamore & Turris, 2009).

In addition to affecting the patient results, long waiting time contributes to congestion in emergency departments, increasing the stress levels between medical staff and decreased the efficiency of the overall hospital. Research indicates that congestion resulted in a decrease in health quality, increasing phenomena of medical errors and postponed treatment for severely sick patients (Willoughby, Chan, & Strenger, 2010). In addition, extended waiting time increases examples of patients' departure without obtaining medical care, presenting significant public health risk (Medeiros, 2016).

From a financial point of view, it is necessary to address waiting time in emergency departments to increase cost efficiency. Delayed Care often increases the extended hospitals and increases health care costs for patients and health care systems equally. Effective emergency department management strategies, including dynamic queue management and lean healthcare functioning, have demonstrated an increase in operating costs with an increase in patient flow (Cantero & Redondo, 2014).

The Emergency Department of Emergency Representation Time represents an important health care challenge recognized worldwide, which has seen variability in diverse healthcare settings. Urban high-volume hospitals face challenges that are different from people faced by small community hospitals. Patient Demographic, Hospital Resource allocation, and policy intervention affect the efficiency of the Emergency Department (Daldoul et al., 2018).

The purpose of this research is to increase health care distribution by identifying and assessing effective administrative strategies for implementation in emergency departments to reduce waiting time. Increased demand for emergency medical services affected by aging population requires the development of sustainable and evidence-based solutions (Saleh, Adel, & Wahed, 2021).

The rationale for this study lies equally in the potential benefits of increased emergency department for patients and healthcare providers. Well-researched administrative strategies can increase the patient's results by facilitating timely care for seriously sick persons. In addition, customized patient flow has the ability to reduce stress and burnouts between medical personnel, which contributes to a more durable work environment (Munro, Mason, & Nicholl, 2005).

This research contributes significantly to emergency care related policy structure. Health policy makers require data- driven recommendations to increase hospital management and optimize resource allocation. The study examines administrative intervention, including triangle optimization, staffing adjustment, and technology-operated patient tracking system to provide actionable insight into various healthcare settings (Islam, Khair, 1 & Khanam, 2020).

Problem Statement

Emergency department (EDS) plays an important role in giving quick medical care to patients with immediate health issues. One of the most permanent and prevailing challenges is, the excessive patient is waiting time. Extended waiting time in emergency departments increased the treatment, reduction in patient satisfaction, and increased risk of medical complications, especially for seriously sick patients (Paling et al., 2020). The issue arises from many factors, such as lack of healthcare provider, inability in the triage system, lack of hospital beds, and increasing number of patients requiring emergency care (Gaughan et al., 2019).

An important issue is inequality between demand and available resources. Many emergency departments effectively face challenges in the management of growing patient volume, resulting in congestion and medical evaluation delays (Havill et al., 1996). Administrative disabilities including insufficient employee scheduling and insufficient applications of advanced patient flow management techniques increase this condition. In addition, inadequate primary care services such as external factors lead to unnecessary emergency department for non-emergency cases, increasing the burden on the system (Purnell, 1995).

Prolonged emergency departments result in adequate clinical, operational and economic results, which are spread beyond simple discomfort.

1. Delay in treatment is associated with negative patient consequences, such as the progression of the disease during the waiting period for high mortality and care is deteriorating the health conditions (Paling et al., 2020). Patients, including stroke or heart attack, have increased the risks associated with delayed emergency care. The extended waiting time also leads to high rates of patients leaving without being seen (LWBS), resulting in potentially untreated medical conditions and subsequent complications (Sultan, 2023).
2. Crowd emergency departments obstruct the workflows of the hospital and adversely affect healthcare provider efficiency. The extended waiting time contributes to increasing stress and burnouts among personnel of the emergency department, which can reduce job satisfaction and increase the possibility of patient care errors (Medeiros, 2016). Delayed discharge hospitals from emergency departments contribute to disabilities in hospitals, leading to upper uneven bed posture rate and low resource availability for upcoming emergency matters (Nyce et al., 2021).
3. Prolonged waiting time contributes significantly to patient dissatisfaction. Research indicates that the extended emergency department is correlated with the waiting time of the waiting time, less confidence in healthcare providers, and a high trend for complaints (Shah et al., 2015). Dissatisfied patients demonstrate a low rearing for medical recommendations and can pursue alternative healthcare solutions, including avoidable hospital readmissions.
4. Long waiting period increases the expenses of health care evenly for hospitals and patients. The congestion increases the operational costs steep by the prolonged patient entry, increased staffing requirements, and resource allocation (McQuestin & Noguchi, 2020). In addition, delayed discharge resulted in hurdles, causing the hospital's ability to accept new patients efficiently.

Significance of the Study

Reducing the patient's waiting time in emergency departments (EDS) is necessary to increase health related results and maintain operational efficiency. The long waiting time contributes significantly to the congested, patient dissatisfaction and negative health results of the emergency department. Studies indicate that long -term waiting time resulted in diagnosis and

treatment delays, leading to increased risk of complications and mortality in severely sick patients (Paling et al., 2020).

Prolonged emergency departments decrease the patient's satisfaction in waiting time, the chances of going to patients without views increase, and more stress on hospital resources (Nyce et al., 2021). Patients who leave the emergency department without treatment may experience a decline in their position, requiring more comprehensive and expensive medical intervention on return. It is important to reduce long waiting times to ensure the safety of the patient and maintain the financial viability of healthcare organizations.

An important factor in reducing waiting time is the provision of equal access to emergency care. Research indicates that individuals living in areas with lower-income or high-population-density often tolerate the extended emergency department waiting time, which spoils health inequalities (Lambe et al., 2003). Effective administrative strategies that streamline the patient's flow can increase health results in various demographic groups within health care systems and improve health results.

Reducing waiting time in emergency departments gives many advantages for healthcare systems and increases the results of the patient.

1. Rapid access to emergency care can improve the patient's survival rate and reduce the risk of complications. Research indicates that for quick intervention, especially for conditions such as heart attack and stroke, improve health results and reduction in recovery period (Alhabib et al., 2024). In addition, the lack of waiting time increases pain management and improves overall patient experience.
2. The efficient management of the patient flow in the emergency department optimizes the allocation of resources, reduces the congestion, and allows medical personnel to focus on severely sick patients. Studies indicate that the implementation of structured workflow enhancement including lean six Sigma and patient-focused care models clearly enhances the operation of the emergency department (Daldoul et al., 2018).
3. Hospitals with high ED wait times often experience higher operational costs due to extended patient stays and increased resource utilization. Reducing waiting times leads to shorter hospital stays, lowering healthcare expenses for both hospitals and patients (Marsh et al., 2004). Additionally, improved ED efficiency reduces the financial burden associated with patient readmissions and emergency revisits.

4. Long waiting times and overcrowding contribute to physician and nurse burnout, reducing job satisfaction and increasing turnover rates among medical staff. Implementing strategies to reduce waiting times alleviates staff stress, allowing healthcare workers to provide high-quality care more effectively (Medeiros, 2016).
5. Reduced waiting times improve patient satisfaction by enhancing their overall experience in the ED. Studies have shown that patients who receive timely care are more likely to comply with medical advice, reducing the risk of further health complications (Sonis & White, 2020). Additionally, a positive healthcare experience builds trust in medical institutions, encouraging patients to seek timely medical care rather than delaying treatment due to concerns about long wait times.

Research Objectives

Main Objective

The primary objective of this study is to analyze and evaluate administrative strategies aimed at reducing patient waiting times in emergency departments (EDs).

Sub Objectives

1. **To assess the impact of prolonged waiting times on patient outcomes and healthcare system efficiency**
2. **To identify key factors contributing to extended waiting times in emergency departments**
3. **To explore and evaluate the effectiveness of different administrative strategies in reducing ED waiting times**
4. **To propose evidence-based recommendations for ED administrators and policymakers**
5. **To examine the role of technology in improving ED efficiency and reducing waiting times**

Research Questions

1. What are the primary causes of prolonged patient waiting times in emergency departments (EDs)?

2. How do prolonged waiting times impact patient health outcomes and overall healthcare system efficiency?
3. What administrative strategies have been proven effective in reducing ED waiting times?
4. What best practices can be adopted by hospital administrators and policymakers to enhance ED efficiency?
5. How does reducing ED waiting times influence patient satisfaction and trust in healthcare services?

Research Hypotheses

H1: Effective ED administration strategies significantly reduce patient waiting times and improve healthcare system efficiency.

H2: Prolonged waiting times in emergency departments lead to poorer patient health outcomes, including increased morbidity and mortality rates.

H3: Reducing patient waiting times in EDs increases patient satisfaction and trust in healthcare services.

Previous Studies

Alhabib et al. (2024) conducted a systematic literature review on the effectiveness of patient-centered care (PCC) models in reducing emergency department (ED) waiting times. The study synthesized evidence from multiple databases and found that PCC significantly improves patient flow, enhances satisfaction, and reduces delays in treatment. The review emphasized the role of communication and patient engagement in optimizing ED operations (Alhabib et al., 2024).

Davari et al. (2018) investigated the effect of the technique management version at the operational performance of emergency departments. Research conducted at al-Zahra Hospital applied simulation methods to identify bottlenecks in affected person triage, physician evaluation, and clinical procedures. The study tested that imposing a dependent workflow and

adapting employee allocation ended in a 9.5% reduction in affected person ready instances and a 6.5% decrease in the patient's waiting time (Davari et al., 2018).

Pitrou et al. (2009) studied a cohort in a French emergency department to evaluate the patient's satisfaction of waiting time. The study identified long -term waiting periods, which contributes to dissatisfaction as the primary factor, with only 72.6% of patients acceptable as waiting time waiting time. Research suggested that delay and better time management strategies can affect the experiences of communication positively (Pitrou et al., 2009).

Willoughby et al. (2010) used the Plan-Do-Study-Act (PDSA) model to evaluate strategies to reduce waiting time in the Emergency Department. The study included direct observation of 1,728 patients and evaluated various interventions including real -time reminder to standardize the workflows between healthcare providers. The results demonstrated that amendments in the physician's revaluation processes caused a significant increase in overall patient throughput (Willoughby et al., 2010).

Tan (2013) examined the impact of dynamic queue management in the emergency departments of the hospital. Research introduced a data-driven model for patient priority that adjusts dynamic allocation based on real-time and historical data. The results demonstrated that this method increased the length of patients in the emergency department, not the intake of the patient (Tan, 2013).

Marsh et al. (2004) examined the impact of system cooperation on time waiting for the emergency department. Various initiatives were presented in the study, such as the admission-by-appointment system, a multi-disciplinary bed officer and centralized telemetry. As a result of intervention, the waiting time for coronary care unit entry declined by 44.9% and increased efficiency of the overall hospital (Marsh et al., 2004).

Daldoul et al. (2018) organized a stochastic optimization model for the reason of decreasing the waiting time for the patients of the Emergency Department. The study tested the adaptation of medical staff schedule and bad allocation, which indicates that the affected patient's waiting time reduced by 23.2% because of extended coordination (Daldoul et al., 2018).

Sinreich et al. (2012) Checked the effects of aligning the work shift with the patient's arrival pattern. Research employed repetition algorithms and simulation modeling to create an

effective staffing schedule. Research indicated that as a result of adaptation of work changes, the total waiting time decreased by 20-45% and the length of living was 7-17% (Sinreich et al., 2012).

Cantero & Redondo (2014) assessed the implementation of queued theory in the operation of the emergency department. Their research has shown that lean healthcare functioning can increase the efficiency of the emergency department without the need for additional personnel or resources. The research demonstrated that minimizing extraneous steps in patient flow processes resulted in considerable time savings (Cantero & Redondo, 2014).

Purnell (1995) surveyed 390 hospitals in the United States to examine the causes and effects of long waiting time in emergency departments. Research indicated that the extended waiting time congestion contributed to increasing the requirements of nursing care and reduced the patient's satisfaction. The study proposed various administrative strategies, such as the purpose of reducing process adaptation and growth, waiting and turnaround time (Purnell, 1995).

Finamore and Turris (2009) investigated the emergency department's crowd (EDC) in Canada and analyzed strategies to reduce the extended waiting time. Research revealed that non-essential patient affairs made significant contribution to the emergency department. A pilot program at Burnaby Hospital implemented a well-organized triage process, decreasing the waiting time, increased the patient's satisfaction, and the congestion of the emergency department overcrowding (Finamore & Turris, 2009).

Wang, Liu, and Sun (2023) examined the physician scheduling in emergency departments to reduce the patient's waiting time. Research established a scheduling structure that integrates the demand of different time and later visits. A mixed-integer programming (MIP) model and heuristic algorithm was employed to customize the physician program, resulting in a significant decrease in the waiting time without an increase in the number of employees (Wang et al., 2023).

Medeiros (2016) conducted a quality improvement study focused on increasing efficiency in the emergency department through the implementation of a systematic provider check-in system. Research indicated that by addressing pending clinical trials for emergency department providers as a result of the implementation of Scheduled check-ins, the waiting time has come down by speeding up communication and intensifying discharge planning (Medeiros, 2016).

Research Gap

Despite a comprehensive investigation on emergency department (ED) management techniques designed to reduce patient waiting time, there are many shortcomings in literature. A significant reduction is the absence of a complete comparison analysis of various administrative interventions. Although several studies have investigated strategies such as lean six sigma, dynamic queue management and physician scheduling, there is a lack of research that directly analyzes the efficacy of these methods in different hospital environments. Many studies focus on a unique intervention within a particular healthcare institute, complicating the most effective technology assessment in various environments, such as urban vs. rural hospitals or resource-rich quantities versus resource-limited settings (Willoughby et al., 2010).

Another gap in the literature is the insufficient exploration of how emerging technologies, such as artificial intelligence (AI) and real-time patient tracking systems, can be integrated with traditional administrative strategies to further enhance ED efficiency. While some studies have examined the role of technology-driven solutions in streamlining patient flow, these studies often lack real-world implementation data. Additionally, few studies have evaluated the cost-effectiveness of these technological interventions, leaving hospital administrators uncertain about the financial feasibility of adopting AI-based triage or predictive analytics for demand forecasting (Tan, 2013).

Furthermore, although various studies acknowledge the impact of patient-centered care (PCC) models on reducing ED wait times, there is a lack of detailed research on how patient engagement and communication strategies influence ED operational efficiency. Many studies focus on workflow optimization from a provider's perspective but fail to account for how transparent communication with patients regarding expected wait times, treatment processes, and service delays could mitigate dissatisfaction and improve patient cooperation, ultimately reducing inefficiencies (Alhabib et al., 2024).

In addition, most of the current studies focus on short-term interventions, ignoring these administrative strategies to evaluate long-term stability. Some studies have cut the waiting time after implementing specific interventions; However, it is inadequate to follow up data to find out whether these improvements are maintained over time or if hospitals return to pre-disabilities after the initial enthusiasm is reduced. Some longitudinal studies have investigated

the stability of the administrative reforms of the emergency department and their accountability for variation in the patient's versions (Deldaul et al., 2018).

Furthermore, although research has examined the effect of congestion of the emergency department on patient health results, there is a relative lack of studies addressing wide implications of time waiting for a long time on health system efficiency, including financial costs, employees' burnouts and advanced rates of hospital readmissions. Research mainly emphasizes patient-level consequences; However, a more comprehensive analysis is required to assess the impact of the waiting time of the lower emergency department on the performance and cost efficiency of the overall hospital (Marsh et al., 2004).

Theoretical Framework

1. Queuing Theory

The queuing principle is a mathematical structure that examines waiting lines and service processes, providing insight to reduce the adaptation of resource allocation and delay in service distribution. This principle helps predict the patient's arrival pattern, identify congested points and prepare strategies to customize patient flow in relation to health care resources available within the Emergency Department (ED) administration. Studies indicate that the application of queuing principles-based models including priority triaging and real-time patients may apply, reduce the waiting time and increase the patient's satisfaction (Cantero & Redondo, 2014). Studies indicate that the improvement in the hospital applying queue-based staffing adjustments is obtained by patient throughput and there is a decrease in congestion in emergency departments (Alavi-Moghaddam et al., 2012).

2. Lean Healthcare Theory

The lean healthcare theory based on the lean manufacturing principles of Toyota emphasizes the removal of disabilities and improving operating flow. The emergency departments increase lean principles in management, increase clinical efficiency, and reduce unnecessary delays in patient care. Hospitals employed by lean -collapsing functioning have documented a significant decrease in waiting for the patient through structured workflows, digital tracking systems and customized staff significance (Verbano & Crema, 2019). Unlike traditional methods that prefer

resource growth, lean healthcare prefers to improve the ongoing process, installing it as a permanent approach to increase the efficiency of emergency department over the long term.

3. Systems Theory in Healthcare Management

The system theory concepts healthcare organizations as an interconnected system in which components such as staffing, technology and patient care dynamically interact. The system theory advocates a comprehensive approach to the disabilities of the emergency department, emphasizing the integration of ED operation in a large context of hospital resource management. Research indicates that applying the system-based approach to in-post bed management can reduce patients boarding time of emergency department, reduce more efficient patient transfer convenience and congestion (Lee et al., 2021).

4. Patient-Centered Care (PCC) Model

The patient-Centered care (PCC) model emphasizes individual treatment strategies that address the needs and preferences of the patient. Emergency departments apply PCC strategies by increasing patient communication, providing real-time updates at waiting time and ensuring transparency in triage decisions. Studies suggest that hospitals adopting patient-focused care structure achieve less waiting time, increase the patient's satisfaction, and increase clinical consequences (Alhabib et al., 2024). Including PCC principles enables ED administrators to establish a patient-centered environment that improves healthcare experiences and optimizes service efficiency.

Methodology

This research employs quantitative functioning, stressing a systematic assembly and statistical examination of data to assess the efficacy of emergency department (ED) management strategies in reducing the patient waiting time. This research employs a deducting approach, which uses the principles established in the emergency department and prior studies to inform the hypothesis construction and testing. The study uses structured data collection methods to present empirical evidence about relations between administrative intervention and efficiency of emergency department.

This study employs descriptive and corrective research design. The descriptive component current emergency department covers a collection of detailed information about administrative

practices, including triangular optimization, staffing models and workflow adjustments. This analysis examines the relationship between special administrative strategies and variations in the patient's waiting time. This method facilitates the identification of patterns and trends in emergency department management, which enables evaluation of which strategies reduce the most effective waiting time.

Data Collection Methods

The study employs both primary and secondary data collection methods to ensure a comprehensive understanding of the research topic.

Primary Data Collection

The primary instrument for data collection will be a structured electronic survey questionnaire, distributed to healthcare professionals working in emergency departments, including administrators, physicians, nurses, and operational managers. The questionnaire will consist of closed-ended questions using a Likert scale to assess perceptions and experiences related to ED administration strategies.

Secondary Data Collection

Published literature, including peer-reviewed journal articles, government reports, and industry publications, will be analyzed to provide theoretical support and background information. Along with institutional reports and official data from healthcare organizations such as the World Health Organization (WHO), Ministry of Health, and hospital performance reviews will be utilized to compare trends and validate survey findings.

The combination of primary and secondary data ensures a robust analysis, offering both statistical evidence from firsthand sources and contextual insights from existing research.

Sampling Strategy

The study employs a random sampling method to select participants from diverse healthcare settings, ensuring a representative sample of ED professionals across different regions and hospital types. The study focuses on healthcare professionals involved in ED administration

and patient care, including ED administrators, physicians, nurses, and hospital management personnel with A minimum of 50 respondents.

Research Tools

To ensure a comprehensive analysis of emergency department (ED) administration strategies for reducing patient waiting times, this study will employ a combination of survey questionnaires and secondary data analysis as its primary research tools. These instruments will facilitate the collection of quantitative data from healthcare professionals and institutions involved in emergency care management.

The survey questionnaire will serve as the main means for data collection, which aims to collect insight from emergency department administrators, physicians, nurses and healthcare professionals. The questionnaire will include closed-up questions using a Likert scale, which will be able to indicate the required emergency department administration strategies, such as triage systems, staffing models, patient flow optimization and technology integration about compromise or degree of disagreement. The survey will be broadcast electronically to facilitate comprehensive participation from various health facilities including large urban hospitals, community health centers and rural emergency units. The inclusion of various institutional references will improve the generality of results.

In addition to survey-based data collection, secondary data analysis will be conducted using published sources such as colleague-review journal articles, government reports, hospital performance records and emergency care guidelines. These secondary data sources will provide significant insights into the study of existing administrative practices, patient flow metrics, and hospitals that have successfully implemented strategies to reduce the waiting time. Official data of healthcare regulatory bodies such as World Health Organization (WHO), National Health Ministry and Hospital Accreditation Agencies will also be reviewed to complement the survey findings.

To ensure the reliability and validity of the data, pre-testing of the questionnaire will be conducted with a small group of healthcare professionals before full-scale distribution. This will allow for refinement in question of clarity and relevance. Furthermore, SPSS statistical software will be utilized for data processing and analysis. Descriptive statistics, such as mean values, standard deviations, and frequency distributions, will be used to identify trends, while

inferential statistical techniques will assess the significance of relationships between different administrative strategies and their impact on ED waiting times.

Study Limitations

While this study aims to provide valuable insights into emergency department (ED) administration strategies for reducing patient waiting times, certain limitations must be acknowledged.

One of the primary limitations is the scope of data collection. The study focuses on healthcare professionals, including ED administrators, physicians, and nurses, which means that patients' perspectives on waiting times and satisfaction levels are not directly included. While patient feedback could offer additional insights, the emphasis on administrative strategies necessitates a focus on healthcare providers' experiences and institutional data.

Another limitation is geographical and institutional diversity. Although efforts will be made to include responses from various hospital types (public vs. private) and locations (urban vs. rural settings), the sample size of 100 participants may not fully capture the variability in ED operations across all healthcare institutions. The findings may be more applicable to larger hospitals with established administrative frameworks, while smaller or under-resourced hospitals may face unique challenges not fully addressed in this study.

The self-reported nature of survey data presents another constraint. Since respondents will provide subjective evaluations of ED administration strategies, their responses may be influenced by personal biases, workload pressures, or organizational policies. Additionally, the study relies on Likert scale-based responses, which, while useful for statistical analysis, may not fully capture the complexity of administrative decision-making in ED settings.

Moreover, the study's reliance on secondary data sources, such as government reports and hospital record, introduces potential data accessibility limitations. Some relevant institutional data on patient waiting times and ED efficiency metrics may be restricted due to confidentiality policies. As a result, the study may need to rely on publicly available datasets, which may not always provide the most up-to-date or comprehensive information.

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