

# **DATA VISUALIZATION & STORYTELLING**

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*A Comprehensive Analysis of Hospital Emergency Rooms*

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# **Report On *A Comprehensive Analysis of Hospital Emergency Rooms***

## **Introduction**

The dynamic realm of healthcare management necessitates a continuous pursuit of operational excellence, as it is a fundamental pillar that influences patient outcomes and hospital performance. This report ventures into the intricate operational facets of an emergency room (ER) by meticulously examining patient visitation data. Our analysis is anchored in an extensive dataset that captures a multifaceted picture of ER activities, incorporating visit timings, patient demographics, wait times, and satisfaction levels, among other variables. The impetus behind this thorough examination is to formulate strategic recommendations that are geared toward enhancing service efficiency, reducing patient wait times, and optimizing the deployment of ER resources.

## **Data Overview**

Central to our analysis is the "Hospital ER.csv" dataset, which serves as a window into the everyday workings of the ER. This dataset is a rich tapestry of information, covering aspects such as patient ages, genders, racial backgrounds, identification numbers, satisfaction metrics, wait durations, and subsequent hospital referrals. By dissecting this dataset, we gain a nuanced understanding of how patients interact with ER services and how these services can be fine-tuned to improve overall patient care.

In handling this dataset, we are acutely aware of the privacy implications that come with personal medical information and ensure all analysis complies with stringent privacy regulations. Despite encountering certain challenges such as gaps in data, particularly within the satisfaction score metrics, the dataset's comprehensive scope allows us to discern significant operational trends and identify pivotal intervention points.

## **Intended Audience**

**Hospital Administrators:** Hospital administrators play a crucial role in overseeing the operational aspects of hospital management. This dataset is an invaluable tool for them, providing a comprehensive view of how the emergency room functions in terms of patient flow, wait times, and demographic patterns. By delving into this data, administrators can gain a deeper understanding of the daily dynamics of the emergency room, which is essential for effective management and planning. The insights derived from the dataset can guide them in optimizing resource allocation, enhancing staff schedules, and improving overall patient care efficiency. It also offers a platform for benchmarking emergency room performance against industry standards, helping administrators identify areas of excellence and opportunities for improvement.

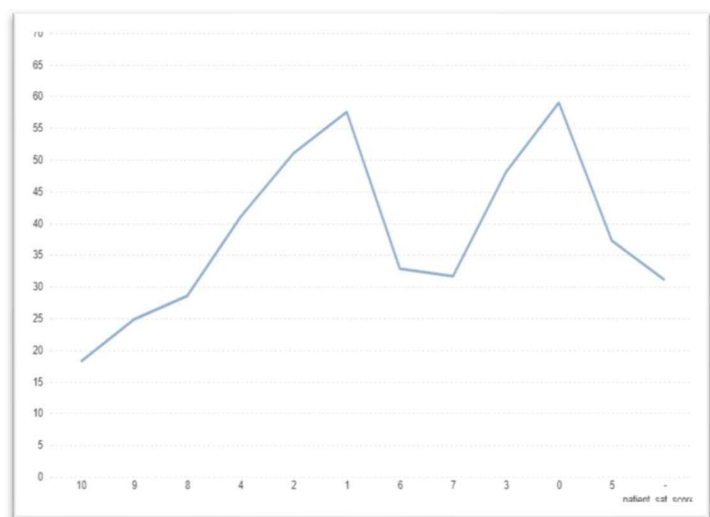
**Healthcare Policy Makers:** Healthcare policy makers are responsible for shaping policies that govern the healthcare system. This dataset serves as a critical resource for these decision-makers, offering evidence-based insights into the workings of emergency rooms. Analyzing this data equips them with factual backing to formulate policies that address the real challenges and needs in emergency healthcare. It can assist in making informed decisions regarding staff training, resource allocation, and the implementation of health initiatives. The dataset's detailed breakdown of patient demographics and wait times can help in tailoring policies that cater to specific population groups or tackle particular inefficiencies within emergency care services.

**Medical Researchers:** Medical researchers focusing on emergency care can find this dataset particularly useful for their studies. It encompasses vital information about patient wait times, satisfaction levels, and demographic trends within the emergency care context. Researchers can utilize this data to conduct thorough analyses, leading to a better understanding of the factors influencing patient experiences in the emergency room. The dataset enables them to identify trends, draw correlations, and make evidence-based recommendations for enhancing patient care. Furthermore, it offers a rich source of information for academic research, contributing to the broader knowledge base on emergency healthcare services and patient care optimization strategies.

By providing detailed, actionable data, this dataset serves as a cornerstone for hospital administrators, healthcare policy makers, and medical researchers, aiding them in making informed decisions that improve the quality, efficiency, and effectiveness of emergency medical care.

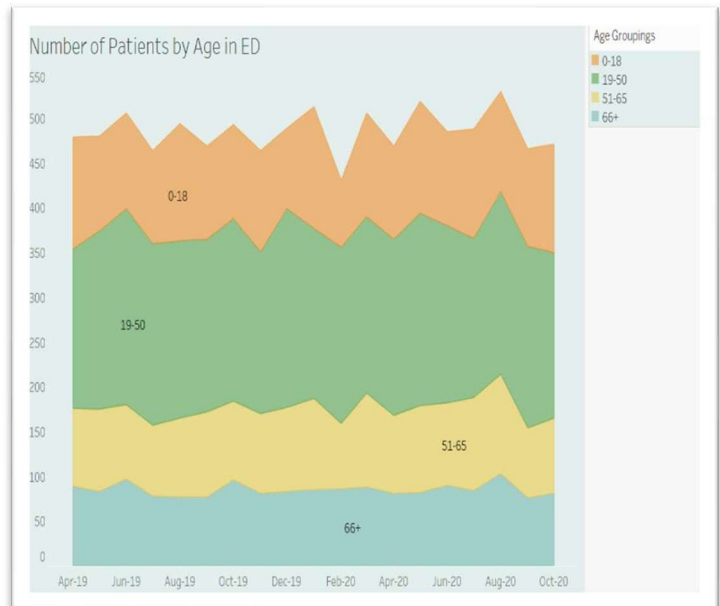
## Wait Time Trends Analysis

An in-depth look at wait time patterns reveals substantial fluctuations across different times and days, indicating areas for potential resource optimization. Interestingly, Saturday afternoons, especially around 2 PM, showcase the least wait times, hinting at a possible misalignment between resource allocation and actual service demand. In stark contrast, the early morning hours of Sundays and Fridays experience the longest wait times, which could be reflective of social patterns that affect ER visitation, such as late-night events or gatherings.



## Patient Demographic Analysis

Our demographic study shows a predominant representation of the 19-50 age bracket among ER visitors, suggesting a higher occurrence of health-related urgencies or injuries in this demographic. The 51-65 age segment shows a moderate frequency of visits, while the data interestingly indicates that the senior demographic, those aged 65 and above, are the least frequent visitors. This pattern prompts a discussion on the accessibility and utilization of emergency services by older adults, which could be influenced by a multitude of factors, including the availability of alternative care pathways, mobility constraints, or their perceived need for emergency care services.



## Wait Time Trends Analysis on Day and Time Basis:

Our data-driven analysis reveals pronounced fluctuations in wait times throughout the week, with afternoons generally experiencing shorter wait times. A noteworthy observation is the considerable decrease in wait times on Saturday afternoons, particularly at 2 PM where the average wait time is approximately 35 minutes. This suggests a potential underutilization of resources or overstaffing that could be recalibrated for improved service delivery.

Conversely, the data indicates a surge in wait times during the early and late hours of weekends, with the highest wait times recorded at 1 AM on Sundays and Fridays. Friday

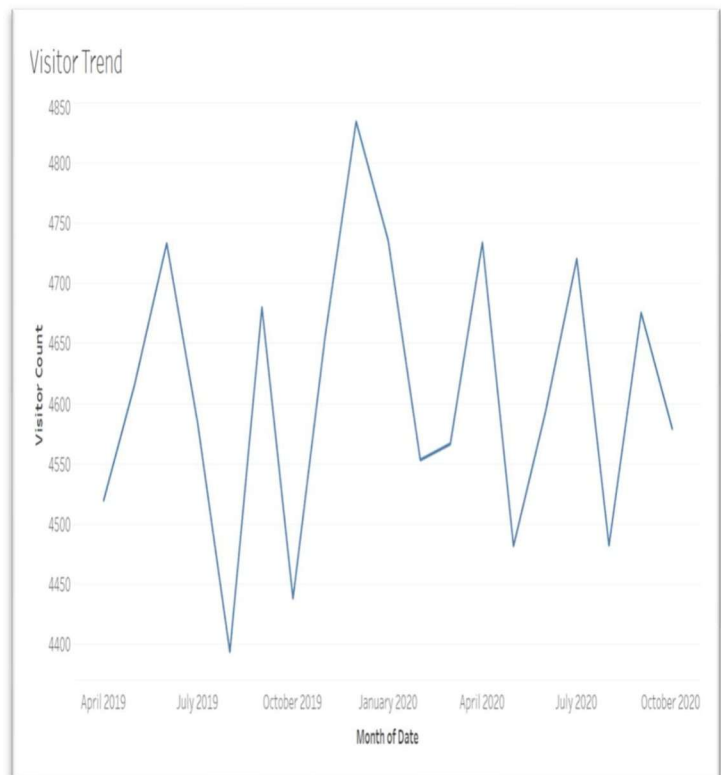
	Sun	Mon	Tue	Wed	Thu	Fri	Sat
12 AM	39.61	38.81	38.85	40.15	36.64	38.22	41.02
1 AM	41.39	38.22	39.03	38.65	36.78	35.79	41.60
2 AM	37.66	35.10	37.39	38.33	36.74	37.07	42.41
3 AM	37.00	38.60	39.02	38.95	38.91	35.31	39.28
4 AM	36.26	38.41	40.12	44.10	37.81	40.43	39.81
5 AM	39.56	39.98	37.15	37.89	37.13	43.02	40.34
6 AM	36.12	40.05	41.16	40.32	38.65	38.61	41.23
7 AM	38.08	40.63	39.77	38.55	40.79	38.04	33.65
8 AM	38.28	39.42	40.15	41.70	40.02	39.35	40.73
9 AM	42.24	41.58	40.94	38.15	40.34	39.12	41.69
10 AM	36.16	37.13	39.61	36.95	38.09	40.24	39.11
11 AM	41.03	39.63	37.62	37.08	37.12	41.49	34.90
12 PM	36.35	41.13	40.56	39.67	40.80	41.80	39.70
1 PM	39.92	36.34	41.19	35.14	38.81	36.64	39.93
2 PM	34.69	38.70	36.39	35.54	37.00	41.50	39.19
3 PM	41.58	37.24	35.96	42.23	39.74	38.93	36.68
4 PM	37.67	37.94	39.56	38.73	38.98	36.90	40.48
5 PM	40.14	36.87	36.91	38.73	38.50	34.70	41.85
6 PM	37.27	40.64	39.53	37.95	41.69	42.12	38.25
7 PM	38.85	39.92	36.85	38.05	41.97	36.62	38.77
8 PM	41.40	36.69	37.45	39.32	36.06	42.31	41.81
9 PM	36.94	39.55	38.30	34.28	39.09	40.89	36.74
10 PM	37.34	39.69	41.73	40.05	40.63	37.80	40.33
11 PM	41.68	38.88	37.66	38.58	40.46	41.80	42.64

at 1 AM presents the most significant challenge, with wait times nearing 42 minutes. These time slots are evidently the busiest and may benefit from strategic staffing enhancements to manage the influx of patients more efficiently.

## Visitor Trends Analysis

The analysis of visitor trends within the ER uncovers a substantial seasonal variation in patient visits. A pronounced dip in attendance is observed in August, with a roughly 25% decline in ER visits. Several factors contribute to this phenomenon:

1. Summer vacations: The ongoing summer break results in a lower local population as individuals and families travel out of town, which directly impacts the volume of visits to the ER.
2. Contagious disease patterns: The summer months typically see a lower prevalence of contagious diseases, likely due to the seasonality of common infectious illnesses and a reduction in close-contact environments such as schools.
3. School breaks: With most schools closed for the summer, the incidence of pediatric emergencies and injuries is reduced, reflecting in the lowered visitation numbers.



These findings offer a clear indication of the seasonal impact on healthcare utilization and highlight opportunities for adjusting operational strategies during these fluctuating periods.

## **Strategic Recommendations**

Arising from the depths of data analysis, we propose the following strategic imperatives:

### **1. Staffing Optimization**

In light of the ebb and flow of patient volumes and to elevate the quality of care across all days, we recommend the following strategies for staffing optimization:

**Dynamic Staffing Model:** We advocate for the adoption of a dynamic staffing model that harnesses real-time data and predictive analytics to anticipate patient influx and calibrate staffing levels dynamically.

**Targeted Staffing Implementation:** We suggest the strategic deployment of additional medical personnel during peak wait time windows, such as weekend and holiday early morning hours, to curtail wait times and augment patient care delivery.

### **2. Preventative Health Programs**

To mitigate the inessential reliance on ER services, especially by individuals aged 19-50, we recommend the following preventative health measures:

**Customized Health Education:** We propose the creation and dissemination of specialized health education programs targeted at the 19-50 age demographic, concentrating on prevalent health issues and preventative strategies.

**Proactive Care Initiatives:** We recommend the establishment of comprehensive preventative care measures, including routine health screenings and management programs for chronic conditions, aimed at identifying and managing health risks before they necessitate emergency intervention.

### **3. Senior Care Accessibility**

To foster better access to and use of emergency services by the senior citizenry, the following strategies are recommended:

**Comprehensive Accessibility Evaluation:** An exhaustive analysis should be undertaken to identify and address barriers to ER access for seniors, considering transportation, mobility, and communication challenges.

**Senior-Focused Outreach:** We recommend the initiation of dedicated outreach programs for seniors to enhance their understanding of ER services, coupled with assistance in transportation and information on alternative care options.

**Expansion of Telehealth Services:** A broadening of telehealth provisions for the elderly is advised, offering remote consultations and care options to alleviate the need for physical ER visits, benefiting those with limited mobility or access to transportation.

## **Conclusion:**

In our detailed examination of emergency room operations, we have identified key opportunities to streamline processes and enhance patient care. Our analysis reveals distinct patterns in wait times and patient demographics, offering actionable insights for improved resource allocation and patient service delivery. These findings underscore the potential for significant advancements in operational efficiency and patient satisfaction within the emergency care sector.

The recommendations presented are designed to guide hospital administrators, healthcare policymakers, and medical researchers in their efforts to refine emergency room functions. By embracing a data-driven approach, stakeholders are well-positioned to implement strategies that will reduce wait times, cater to demographic-specific healthcare needs, and ultimately elevate the standard of emergency medical services. This report serves as both an analysis of the current state and a strategic roadmap for future improvement in the pursuit of healthcare excellence.

## **Closing Remarks**

The insights and recommendations presented in this report are crafted to serve as a strategic compass for hospital administrators, health policy makers, and medical researchers alike. The judicious implementation of these recommendations promises to markedly refine the quality of emergency medical services, elevate patient satisfaction, and hone the operational efficacy of the ER, creating a more resilient.