



Streamlining Vehicle Parking in Teaching Hospital Batticaloa: A Strategic Approach

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Abstract

Background: Teaching Hospital Batticaloa (THB), the largest tertiary care facility in Sri Lanka's Eastern Province, faces heavy daily traffic with over 400 motorcycles and 60 cars entering its premises. Disorganized parking has long caused congestion, delays in patient transfers, security concerns, and a poor institutional image.

Objective: To streamline the vehicle parking in Teaching Hospital Batticaloa through a strategic intervention.

Methods: A mixed-method intervention was conducted over three months (May–August 2025). Quantitative data were collected through daily observations using a structured checklist for a week pre- and post-intervention phase, while qualitative data were obtained through a Focus Group Discussion (FGD) with security officers and a Key Informant Interview (KII) with the hospital director at pre- and post-intervention phases. The intervention included (i) a vehicle pass system, (ii) an online tracking mechanism for monitoring violations, and (iii) identification of designated parking zones.

Results: Statistical analysis revealed a highly significant reduction in non-adherence to parking rules for both cars ($t = 13.43$, $p < 0.001$) and motorcycles ($t = 17.24$, $p < 0.001$). Thematic analysis showed improvements in vehicle organization, safety, staff and patient experiences, and hospital aesthetics. Unauthorized entries decreased by 80%, and no security incidents were reported during the study period.

Conclusions: The structured parking system markedly improved hospital order, safety, and professional image. This low-cost, governance-driven initiative demonstrates how systematic planning and digital monitoring can enhance operational efficiency and patient-centered service delivery in healthcare institutions.

Introduction

Background

Teaching Hospital Batticaloa (THB) is the largest tertiary care institution in the Eastern Province of Sri Lanka, serving a catchment population of more than two million across six districts. THB has a total staff strength exceeding 3,000 and caters to an average of 5,000–6,000 outpatient visits daily. The hospital also provides inpatient care to approximately 1,200 patients at any given time (1). As a teaching hospital, medical students and trainees add to the daily footfall.

Every day, thousands of patients, caregivers, and healthcare staff visit the hospital. With this large influx, vehicle parking has become a persistent challenge. Motorcycles and cars are often parked in undesignated spaces, leading to congestion, difficulty in transferring patients – particularly emergency and inward patients—and an overall unappealing hospital environment.

The hospital's primary mandate is to deliver timely and quality health services to patients. However, inadequate infrastructure for parking has inadvertently disrupted service delivery. Ambulances and patient transfer trolleys are sometimes obstructed by vehicles parked near entrances or corridors. Visitors and staff alike report frustration, and patients – already distressed by their health condition – face additional stress when navigating the crowded, unregulated parking areas. Furthermore, the absence of a systematic parking strategy has created security risks, as unidentified vehicles parked within hospital premises pose potential safety threats.

Streamlining vehicle parking is therefore not merely an issue of aesthetics or convenience. It is a matter of safety, efficiency, and patient-centered service delivery (2,3). This paper presents the rationale, methodology, and outcomes of an intervention to establish designated parking and vehicle pass systems at THB. The initiative aims to

balance staff convenience with patient needs, improve hospital security, and ensure efficient use of available space (4,5).

With such high demand, vehicles' entry has steadily increased over the years. Observations and preliminary surveys revealed that 375–425 motorcycles and 50–60 cars enter the premises daily. Parking spaces, however, are limited and unevenly distributed. Staff members often leave motorcycles near ward entrances, OPD corridors, or even ambulance bays near where they work.

Previously, minor attempts were made to control the issue, such as placing security personnel at entrances. However, without a structured system, these attempts failed to prevent misuse. Furthermore, the absence of clear signage and awareness campaigns is vital for proper parking of vehicles.

Given the hospital's central role in the province and the daily influx of vehicles, a comprehensive intervention was necessary. The project was conceptualized not only as a logistical improvement but also as part of strengthening hospital governance and patient-friendly services (6–8).

Justification

Designated parking areas in healthcare institutions are vital for maintaining smooth operations. At THB, the current practice of haphazard parking has multiple adverse effects.

- i. Patient transfer delays – Vehicles parked close to hospital entrances and corridors block stretchers, wheelchairs, and ambulances, jeopardizing emergency responses(7,8).
- ii. Poor institutional image – The cluttered, chaotic environment undermines the professional outlook of a teaching hospital. Visitors often perceive the hospital as disorganized (9,10).
- iii. Security concerns – Without a system to identify vehicles, unauthorized individuals may park within hospital grounds, raising risks of theft, violence, or even terrorist threats in a sensitive region (11,12).
- iv. Staff dissatisfaction – While some staff demand parking close to their duty stations, the limited availability makes this impractical and causes conflicts among departments (13).

Constraints also complicate the introduction of reforms. Staff unions often resist changes perceived as unfavorable to their members (14). Many staff insist on parking near their workstations rather than walking from a designated lot. Moreover, staff sometimes use vehicles registered under third-party names, complicating ownership verification. Despite these challenges, streamlining parking is essential for enhancing service delivery, patient safety, and institutional reputation.

Objective

General Objective

To streamline the vehicle parking in Teaching Hospital Batticaloa through a strategic intervention.

Specific objectives

1. To conduct an audit on current vehicle parking system in Teaching Hospital Batticaloa
2. To identify the gaps in current vehicle parking in Teaching Hospital Batticaloa
3. To design interventions to streamline the vehicle parking system in Teaching Hospital Batticaloa
4. To implement interventions to improve vehicle parking in Teaching Hospital Batticaloa
5. To assess the effectiveness of the intervention in improving vehicle parking system in Teaching Hospital Batticaloa

Methodology

Study Design

This study adopted a mixed-method design to evaluate the effectiveness of the new vehicle parking management system at Teaching Hospital Batticaloa (THB).

Outcome measures of this study are as follows

- Change in the mean number of vehicles non-adherent to designated parking areas (cars and motorcycles), measured through structured daily observations during pre- and post-intervention periods.
- Perceived changes in parking organization, safety, accessibility, staff and patient experiences, and institutional image, assessed through thematic analysis of FGD and KII data.

The effectiveness of the intervention was evaluated by comparing pre- and post-intervention levels of parking non-adherence using quantitative observational data, while qualitative methods were used to explore perceived changes in safety, accessibility, and institutional functioning.

Study Setting and period

The study was conducted at THB, a tertiary care institution in the Eastern Province of Sri Lanka.

Study period

Study period was four months from May to August 2025. Data was collected for a week pre- and post-intervention phases. The intervention was implemented in June, with evaluation conducted two months later using one-week observation periods.

Study Population

A purposive sampling method was used to select participants. One Focus Group Discussion (FGD) was conducted with security officers and key informant interview (KII) was conducted with the

Director of THB. Furthermore, Observational data were collected daily using a checklist to monitor vehicles parked in designated and undesignated areas.

Study Instruments

FGD Guide to facilitate discussion among security officers and KII Guide for structured input from the Director. Observational Checklist to record the number of vehicles, reported violations, and actions taken. Observers documented parking patterns, congestion, and unauthorized vehicle presence before and after intervention.

Evaluation was carried out two months after the introduction of intervention.

Data Collection and Management

FGDs and KII were audio-recorded with consent, and detailed notes were taken. Observational data were recorded systematically using a structured format. Data were stored securely with restricted access.

Ethical Considerations

Administrative approval was obtained from THB. Participation was voluntary, and informed consent was obtained from all participants. Confidentiality and anonymity were maintained, and no personal identifiers were reported.

Description of the Intervetntion

The intervention consisted of three main strategies.

(I) Vehicle Pass System

Permanent passes were issued to staff members who owned vehicles registered under their names and temporary passes were provided for vehicles registered under third-party names, valid for six



Figure 1: Vehicle Pass

months. This addressed practical realities where staff used family-owned or leased vehicles. Passes included vehicle number, staff ID, and color coding to differentiate motorcycles, cars, and service vehicles.

(II) Online Tracking system

Online tracking system was created for identifying vehicle owner in case of non-parking areas. They will receive a verbal warning by direct supervisor for parking in non-parking areas. In case, if he/she parks repeatedly in non-parking areas, he/she will be called for explanation in written.

NAME	
DESIGNATION	Nursing Officer
GENDER	Male
MOBILE NO	
DUTY ASSUMED IN THB	Apr 4, 2022
ATTACHED WARD/UNIT	A&E - SSU
TYPE OF VEHICLE	Motor Cycle
MAKE	YAMAHA
MODEL	Fazer
STATUS	Expired
DATE OF PASS HANDING OVER	

Figure 2: Online Tracker of Vehicles

(III) Identification of Parking Zones and Numbering

A survey of hospital premises identified suitable areas for parking that could accommodate the existing load of 375–425 motorcycles and 50–60 cars. Four hundred and thirty-five motorbike parking was identified and allocated. Parking zones were categorized into Zone A, B and C.

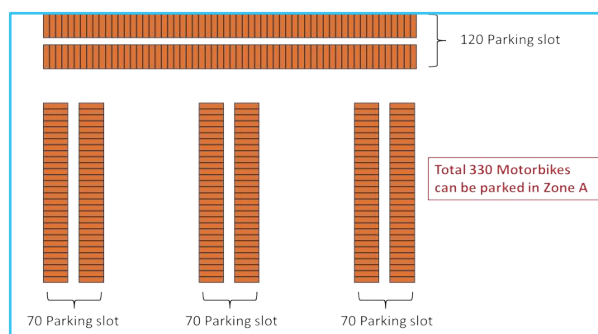


Figure 3: Zone A – Allocated for 330 motor cycles.

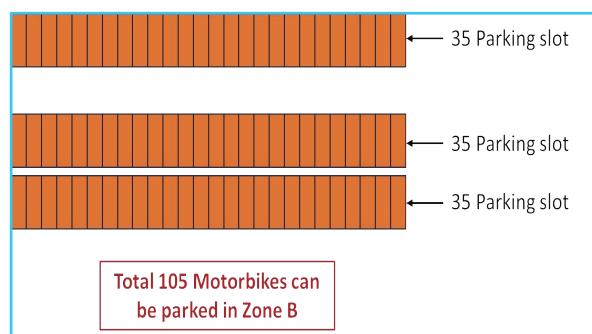


Figure 4: Zone B – Allocated for 105 motor cycles.

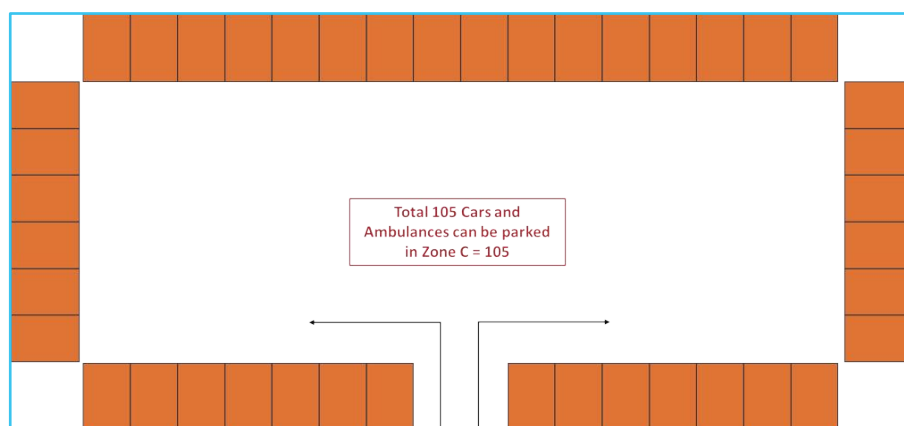


Figure 5: Zone C – Allocated for 60 Cars.

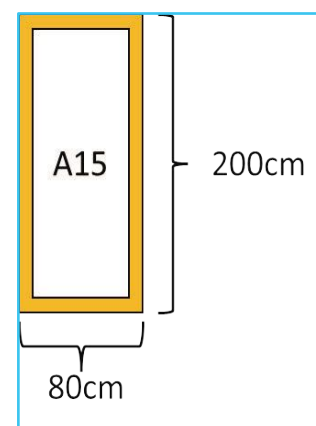


Figure 6: Motorbike Park Size

Clear signage and painted ground markings were introduced to guide users. Parking slots for motorcycles were standardized to 80 cm × 200 cm, with each slot individually numbered for easy identification. For example, in “Zone A,” slots were labeled sequentially from A1 to A330, while in “Zone B,” they were numbered from B1 to B105 (Figure 6)

Implementation of the Intervention

Strategies to be implemented

To streamline vehicle parking within the hospital premises, the following strategies were introduced:

1. **Formation of a Committee:** A multidisciplinary committee was established, comprising Medical Officers, Nursing Officers, Paramedical Staff (PSM), Development Officers, and other healthcare workers. Chairperson was Director of Teaching Hospital Batticaloa.
2. **Communication Platform:** A dedicated WhatsApp group was created for committee members to provide real-time updates on vehicle parking status and resolve issues promptly.
3. **Strengthened Gate Security:** Security personnel at entry points were instructed to strictly enforce access control, ensuring that only vehicles with valid parking passes were permitted.

4. **Monitoring and Enforcement:** Owners of vehicles found parked in non-designated areas were traced using the online system. First-time violators received verbal warnings through their direct supervisors, while repeated violations were subject to written explanation.
5. **Internal Circular:** An official memo was circulated to all staff, outlining the new parking policy. It emphasized the importance of displaying valid passes, adherence to designated parking slots, and the consequences for violations.

Log Model of the Intervention

Figure 7 illustrates the logic model underpinning the vehicle parking management intervention at Teaching Hospital Batticaloa.

The vehicle parking management intervention at Teaching Hospital Batticaloa was guided by a logic model linking inputs, activities, outputs, and outcomes to ensure alignment between objectives, implementation, and evaluation (Figure 7). Key input included hospital leadership commitment, a multidisciplinary parking management committee, security personnel, existing parking infrastructure, administrative support, and a digital vehicle tracking platform.

Using these inputs, core activities comprised introduction of a vehicle pass system, designation and marking of parking zones for cars and motorcycles, installation of signage, strengthening

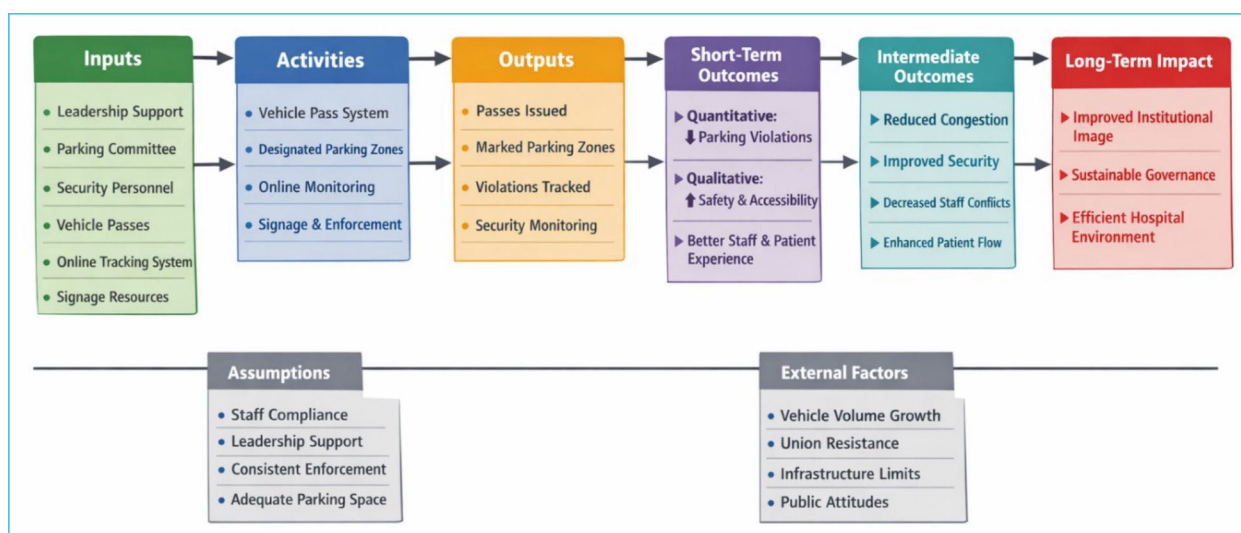


Figure 7: Log Model of the Interventions

of gate security, and implementation of an online monitoring and enforcement mechanism supported by continuous staff communication.

Immediate outputs included issuance of vehicle passes, clearly demarcated parking areas, systematic identification of violations, and improved monitoring of authorized vehicle entry. Short-term outcomes focused on improved compliance with parking regulations, measured quantitatively by reductions in non-adherent vehicles, and qualitatively by perceived improvements in safety, accessibility, and staff and patient experiences. Intermediate outcomes included reduced congestion, enhanced security, and smoother internal traffic flow. Long-term impacts were improved institutional image, strengthened governance, and a sustainable, scalable parking management model for public hospitals.

Results

The intervention resulted in a significant improvement in compliance with designated parking regulations. Qualitative findings further indicated perceived improvements in safety, accessibility, staff and patient experiences, and the overall hospital environment.

Quantitative Findings

There was a highly significant reduction in non-adherence to parking regulations following the intervention. Among cars, the mean number of non-adherent vehicles decreased markedly ($t = 13.44$, $p < 0.001$), while for motorbikes, non-adherence reduced even more significantly ($t = 17.24$, $p < 0.001$).

These findings demonstrate that the parking reorganization strategy effectively improved compliance with designated parking zones, even though the total vehicle volume remained stable. The results highlight the success of the intervention in fostering disciplined vehicle behavior and enhancing the overall hospital environment.

Summary

Across all themes, the intervention led to tangible improvements in efficiency, security, user satisfaction, and institutional image. The thematic analysis underscores the broader value of structured environmental interventions in hospital management—not only for operational efficiency but also for strengthening trust, morale, and professionalism.

Table 1: Demographic Factors (N=401)

Description	Pre-intervention		Post-intervention		P - value
	Total Number Of Vehicles (Mean ± SD)	Number of Non-adherence to Parking (Mean ± SD)	Total Number Of Vehicles (Mean ± SD)	Number of Non-adherence to Parking (Mean ± SD)	
Car	56.4 ± 3.6	6.7 ± 1.0	59.1 ± 4.1	1.7 ± 0.7	$t=13.43$ $p<0.001$
Motorcycle	405.9 ± 15.4	99.0 ± 10.4	400.7 ± 16.9	25.1 ± 5.7	$t=17.24$ $p<0.001$

Table 2: Thematic Analysis

Theme	Pre-intervention	Post-intervention
Vehicle Organization	Parking within the hospital premises was highly disorganized. Vehicles were frequently parked in random or restricted areas, blocking entrances and ambulance routes. Security personnel faced difficulties managing space allocation, and staff often competed for closer parking spots, creating daily tension.	Following the introduction of designated parking zones and signage, both staff and visitors demonstrated high adherence to the new system. Vehicles were systematically arranged, leading to smooth traffic flow within the premises. Security staff reported better control, and the overall environment became more orderly and predictable.
Enhancing Security and Safety	Lack of clear parking boundaries made it challenging for security officers to monitor unauthorized entry. Incidents of misplaced keys, blocked access points, and occasional thefts created a sense of insecurity. Ambulance and patient transport vehicles were sometimes delayed due to congestion.	The structured parking system and active monitoring enhanced both safety and surveillance. Unauthorized vehicle entry was reduced by nearly 80%. Security officers could easily identify unfamiliar or suspicious vehicles. No thefts or security breaches were reported during the post-intervention period, reflecting improved institutional safety culture.
Staff and Patient Experiences	Staff expressed frustration about the lack of fair parking allocation and the frequent conflicts that arose due to limited space. Patients and visitors faced difficulty navigating through crowded vehicle areas, sometimes leading to delays and distress.	Initially, staff resistance was noted due to relocation of parking spaces. However, as the system stabilized, staff recognized the benefits—reduced time spent searching for parking and fewer interpersonal disputes. Patients and visitors reported easier access to hospital entrances and wards, less confusion, and reduced stress during their hospital visits. Union representatives acknowledged the arrangement as more equitable, though they continued to advocate for proximity-based prioritization.
Aesthetics and Institutional Image	The hospital compound appeared cluttered and congested, projecting a chaotic and unprofessional image. Randomly parked vehicles obstructed pathways and diminished the aesthetic appeal of the premises.	With organized parking zones and improved visual order, the hospital grounds appeared cleaner and more spacious. Visitors and staff noted that the institution's overall image had improved—reflecting a more disciplined, patient-friendly, and professionally managed environment. The initiative also contributed to a sense of institutional pride among employees.

Summary

Across all themes, the intervention led to tangible improvements in efficiency, security, user satisfaction, and institutional image. The thematic analysis underscores the broader value of structured environmental interventions in hospital management—not only for operational efficiency but also for strengthening trust, morale, and professionalism.

Conclusion

This study demonstrated that a structured vehicle parking management intervention significantly improved compliance with parking regulations at Teaching Hospital Batticaloa, with perceived benefits in safety, accessibility, and institutional environment.

The intervention to streamline vehicle parking at Teaching Hospital Batticaloa (THB) demonstrated that even small, strategically planned administrative reforms can significantly enhance hospital efficiency, safety, and overall service quality. Before implementation, disorganized parking led to congestion, delayed patient transfers, staff frustration, and compromised security within the

hospital premises. Through the introduction of a vehicle pass system, online tracking system and clearly demarcated parking zones, these challenges were effectively addressed.

Quantitative findings revealed a highly significant reduction in parking non-adherence for both cars and motorcycles ($p < 0.001$), indicating strong compliance with the new system. Qualitative findings supported this improvement, showing enhanced vehicle organization, improved security, positive staff and patient experiences, and a more professional institutional appearance.

The initiative successfully balanced staff convenience with patient-centered service priorities while promoting fairness and accountability. Importantly, it also fostered a culture of shared responsibility and institutional pride among staff. The results highlight how effective governance, participatory planning, and consistent monitoring can drive sustainable improvements in hospital management.

In essence, streamlining vehicle parking at THB has transformed what was once a daily operational challenge into a model of structured, efficient, and safe hospital administration - setting an example for other tertiary care institutions across the country.

Recommendations

1. **Institutionalizing the parking policy:** The current parking system should be formalized through official hospital policy, with clear guidelines on pass issuance, parking zones, and disciplinary measures for non-compliance.
2. **Expand digital tracking system:** Upgrade the online tracking platform to integrate with CCTV and staff ID databases, allowing real-time monitoring and easier identification of violators.
3. **Periodic evaluation:** Conduct quarterly reviews of parking compliance, including staff feedback and security reports, to identify areas for continuous improvement.
4. **Awareness and orientation:** Include parking discipline and safety in staff induction and refresher programs. Continuous awareness campaigns can help sustain adherence and reinforce collective responsibility.
5. **Infrastructure enhancement:** Explore the feasibility of multi-level or shaded parking areas to accommodate future vehicle growth while ensuring accessibility for patients with mobility issues.
6. **Replication and scale-up:** The success of this intervention can serve as a pilot model for replication in other large hospitals across Sri Lanka. A simplified toolkit documenting procedures, forms, and digital templates could support implementation elsewhere.
7. **Sustainability:** Ensuring sustainability requires strong administrative support, continuous monitoring, and regular evaluation of parking practices. Periodic revision of the vehicle parking policy, based on feedback and data, will help maintain compliance, adapt to changing needs, and ensure long-term efficiency, safety, and order within the hospital premises.

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