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Optimizing Discharge Processes to Alleviate Emergency Department Overcrowding: An Audit in a Central Malaysian Tertiary Hospital

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Discharge Delays;
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ABSTRACT

Introduction: Emergency Department (ED) overcrowding is a global challenge, often exacerbated by delays in discharging patients from inpatient wards. In Malaysia, this issue is especially pressing in tertiary hospitals, where prolonged discharge times hinder bed turnover and contribute to ED congestion.

Methods: A 30-day cross-sectional audit was conducted in a medical ward of a central tertiary hospital in Malaysia, involving 109 consecutively discharged patients selected via total sampling. Discharge duration was measured from the point of medical fitness for discharge to actual bed vacancy. Data were analysed using descriptive statistics to identify patterns and sources of delay.

Results: The mean discharge duration was 420 minutes—more than double the 180-minute target—with only 7% of patients meeting the benchmark. Key delay factors included insufficient pre-discharge planning, limited staffing, delayed documentation and pharmacy processes, poor IT infrastructure, logistical challenges, and social support issues. Complex cases requiring multidisciplinary input experienced the longest delays.

Conclusion: To improve hospital efficiency and reduce ED overcrowding, hospitals should implement structured early discharge planning, enhance staffing, upgrade digital infrastructure, and establish a discharge lounge. Strengthening interdepartmental coordination and integrating social support services earlier in the discharge process are also crucial.

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INTRODUCTION

Delays in hospital discharge occur in the majority of hospitals and result in the inadequacy of beds for new patients from the Emergency Department (ED) to be admitted to wards within a targeted time frame (1,2). This contributes to patient overcrowding in the ED, a major problem faced around the world (3). In Malaysian hospitals, this is no exception, particularly when it comes to the care and treatment of medical patients (4).

ED overcrowding can be described as an extremely busy situation in which the team is being forced to work beyond its capacity (5). Overcrowding can lead to multiple negative effects such as patients leaving without treatment, high utilisation rate among medical staff, medical errors, poor patient outcomes, increased morbidity and increased mortality (6). This can also negatively influence patients' perception of the service quality of the hospital, be vividly reported on the mainstream media and social media, thus causing pressure on the hospital management. While numerous factors contribute to overcrowding, three key elements play a fundamental role: the influx of patients (input), the time required to assess and treat them (throughput), and the rate at which patients are discharged from the emergency department (output) (7).

Among these, patient boarding was found to be one of the most significant (8). Boarding is the practice of keeping patients admitted to the ED for prolonged periods due to inadequate capacity of inpatient wards. Exit block has a strong impact as well on overcrowding and is directly connected with the output factors. The phenomenon of exit block arises when patients in the Emergency Department (ED) who require inpatient care are unable to secure appropriate hospital beds in a timely manner (9). Exit block, as demonstrated by a major Australian study, causes an increase in the waiting time, and blockade can amount on average to up to 60% of transit time in the ED (10).

Delays in discharge processes creates an exit block, and patients are bound to remain longer than necessary in the emergency department. With the ever-increasing demand on acute healthcare, the hospital discharge process and delay considered relevant in achieving optimal performance in clinical settings and to reduce the burden of ED overcrowding. Most patients are discharged by doctors during morning reviews; however, the process of discharge is complex, needing specific documents, appointments, referrals, medications and administration processes. Though patients are termed fit for discharge early in the day, it is these processes that keep them in the ward for a longer period of time till allowed to leave home. The core function of the ED is to provide urgent care, offering rapid diagnosis and necessary medical or surgical interventions. Once a patient stabilizes and is scheduled for admission under the medical team, the Bed Management Unit (BMU) is responsible for locating a suitable inpatient bed, followed by confirmation from the ward nurses.

This audit aims to examine the discharge processes in a medical ward of a central tertiary hospital in Malaysia, focusing specifically on the steps that occur after a patient is deemed medically fit for discharge by the attending physician. Despite recent expansions of medical wards by the Medical Administrative team in response to increased post-COVID-19 patient loads, ED overcrowding remains a persistent challenge. Delays in discharging stable inpatients are a key contributor to this issue, as they limit bed turnover and exacerbate exit block, thereby prolonging ED boarding times. To address this, the audit seeks to answer the following research question:

What are the primary factors contributing to discharge delays for medically fit patients in a Malaysian tertiary hospital medical ward, and how can these inefficiencies be addressed to reduce ED overcrowding?

By identifying specific bottlenecks and proposing targeted, system-level improvements, this audit aims to streamline the discharge process, enhance bed availability, and ultimately improve patient flow and hospital efficiency.

METHOD

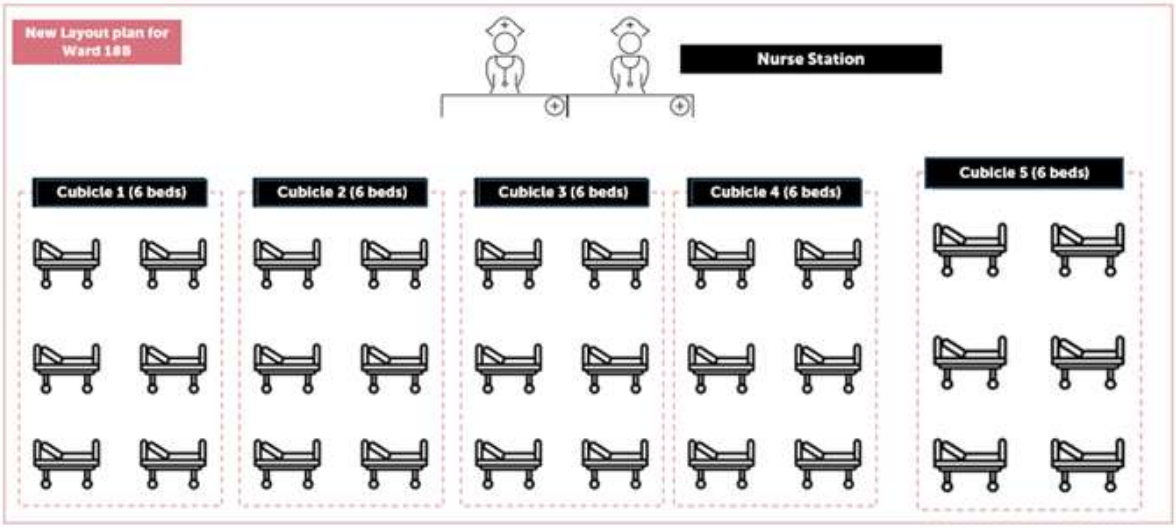

Figure 1. Current Ward Layout

This cross-sectional study was conducted over a 30-day period, from 1st to 30th September 2022, in a medical ward of a central tertiary hospital in Malaysia. The audit was carried out in one of 20 medical wards in the hospital, which is equipped with 30 functioning beds distributed across five cubicles, each containing six beds. Figure 2 illustrates the layout of the ward: Cubicle 4 accommodates critically ill patients (e.g., those on mechanical ventilation, inotropic support, or high-flow oxygen therapy), while Cubicle 3 is used for subacute cases. The remaining cubicles house less acute patients. The ward operates under a multidisciplinary team consisting of a Consultant, Specialist, Registrar, eight Medical Officers, and two Ward Sisters on weekdays, with 20 nurses working across three shifts. Each Medical Officer is typically responsible for 1–2 cubicles. Morning rounds, which last approximately 2.36 hours, prioritize the critically and sub acutely ill patients in Cubicles 3 and 4. Patients meeting clinical stability criteria (e.g., resolved acute issues, normal lab results, and hemodynamic stability) are declared medically fit for discharge during or after these rounds.

A consecutive sampling method was employed to include all patients who were declared medically fit for discharge during the study period. Exclusion criteria included patients who died during admission, were discharged against medical advice, or experienced acute deterioration that altered discharge plans. The discharge time was defined as the point when the attending physician documented the patient as fit to leave. The "time bed is empty" referred to when the patient physically vacated the bed, which is recorded through the hospital's digital census system and used to inform the Bed Management Unit for real-time bed tracking and billing clearance. To ensure data reliability and minimize measurement bias, ward staff were trained in standardized documentation protocols, and the same data collectors were used throughout. Periodic random cross-checks against the hospital's electronic tracking system were also conducted. Data were compiled using Microsoft Excel and analysed using descriptive statistics in SPSS. Before addressing discharge delays, the audit first examined the average waiting times in the Emergency Department (ED) for patients awaiting admission to the ward. As illustrated in Figure 2, the average ED-to-ward transfer time was 522 minutes (9 hours and 11 minutes). The longest recorded wait was 667 minutes (11 hours and 7 minutes), and the shortest was 373 minutes (6 hours and 22 minutes)—all well above the expected timeframe for ward admission. These findings reinforced the need to optimize ward discharge processes to improve bed availability.

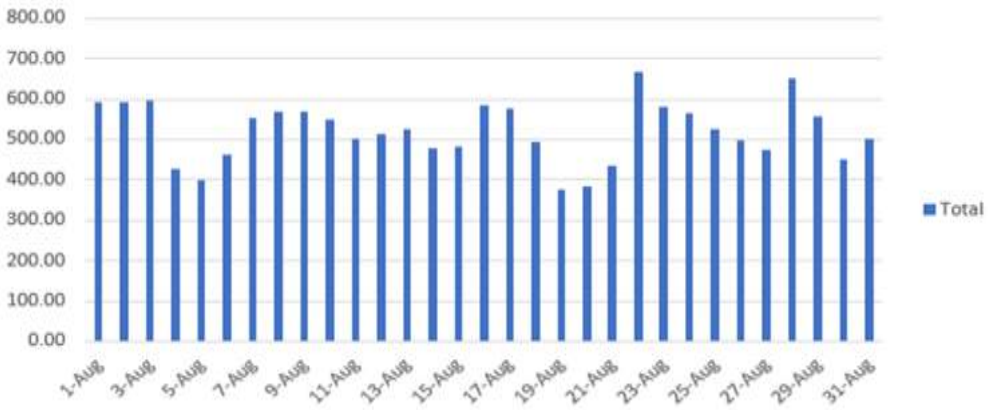

Figure 2. Average waiting time of medical patients in ED

RESULTS

A total of 109 patients met the inclusion criteria during the 30-day audit. The average time from discharge decision to bed vacancy was 420 minutes (7 hours), with individual times ranging from 25 minutes to 13 hours and 45 minutes. To assess the severity of delay, patients were categorized into three groups based on Ministry of Health Key Performance Indicators (KPIs):

0–180 minutes: met target
181–360 minutes: moderately delayed
>360 minutes: significantly delayed

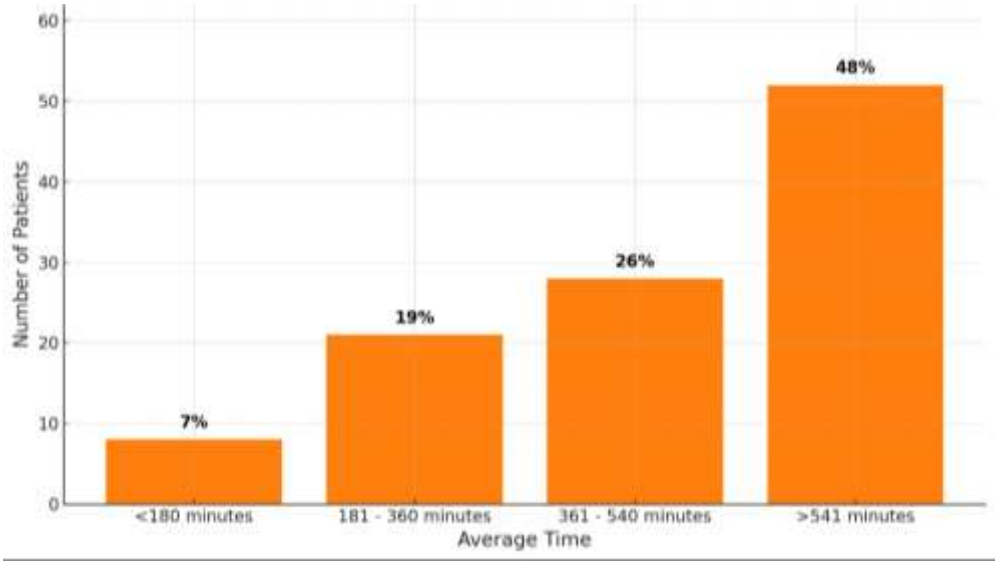

Figure 3. Time taken for patients to leave the ward once discharge

As shown in Figure 3, only 7% of patients vacated their beds within the 180-minute target, 19% between 181–360 minutes, and a substantial 74% beyond 360 minutes—highlighting systemic inefficiencies in discharge execution.

Table 1. Weekly Discharge Time Statistics

Week	Week Range	Mean (hrs)	Mode (hrs)	Std Dev (hrs)
1	2022-08-29 to 2022-09-04	5.44	0.92	4.42
2	2022-09-05 to 2022-09-11	7.67	8.67	2.49
3	2022-09-12 to 2022-09-18	6.55	5.75	2.96
4	2022-09-19 to 2022-09-25	6.44	3	3.7

Weekly discharge trends are presented in Table 1, showing variability across the study period. The second week recorded the highest average discharge time at 7.67 hours, while the first week had the lowest average at 5.44 hours. The mode of discharge times also fluctuated significantly, from 0.92 to 8.67 hours, indicating a broad range of discharge patterns. Notably, Week 1 had the greatest variability, with a standard deviation of 4.42 hours, suggesting inconsistent discharge efficiency.

Shorter discharge durations were typically observed in patients with simple conditions, such as mild viral illnesses, or those who were ambulant and required no post-discharge support. In contrast, delays were longer among patients with multiple comorbidities, especially when their discharge required complex coordination—such as preparing prescriptions, arranging follow-up appointments, training caregivers, and organizing medical equipment.

Figure 4. Reasons for delay in patients leaving the ward once discharged

Figure 4 summarizes the major reasons for discharge delays. These include inadequate pre-discharge planning, delays in preparing discharge summaries and medications, limited staffing and infrastructure, and social or logistical issues such as unprepared families or transport problems. Patients requiring multidisciplinary care—such as physiotherapy, occupational therapy, or multiple specialty referrals—were most affected by extended discharge times.

DISCUSSION

The Ministry of Health's key performance indicator (KPI) for Bed Waiting Time is established at 240 minutes, with an expectation that discharged patients vacate their beds within 180 minutes(11). This allocation allows sufficient time for bed cleaning and preparation for the admission of new patients from the Emergency Department (ED). Bed Waiting Time is defined as the interval between the decision in the ED to admit a patient and the patient's transfer to a bed in the medical ward(12). Delays were observed when patients took longer than 180 minutes to leave their beds. This study offered valuable insights into the factors contributing to such delays and identified areas for improvement to expedite the admission process for new patients from the ED. During the audit, several key factors contributing to delayed patient departure after discharge were identified, as illustrated in Figure 4.

The first factor contributing to discharge delays is the lack of adequate preplanning and preparation for patient discharges or ward transfers. When a patient is discharged, essential documents, appointments, and medications must be organized(13). However, it was found that ward doctors often fail to plan for a tentative discharge date, particularly for patients showing clinical improvement, which hinders early preparation. For instance, a patient admitted with a myocardial infarction and scheduled for anticoagulation treatment might show improvement within three days but remain in the ward for treatment completion. In such cases, it would be prudent to prepare discharge letters and referrals a day or two in advance, allowing for minor adjustments if needed. This approach could significantly streamline the discharge process on the actual day of discharge (14).

A critical component of discharge preparation is the timely creation of a discharge summary, which details the patient's medical history, procedures, and important laboratory results during their stay. For patients who are nearing discharge, especially those with extended hospitalizations, the discharge summary is often not prepared until the day of discharge. This can cause considerable delays, particularly when the patient's medical history is complex. To avoid this, it is advisable to maintain an ongoing summary sheet, updated with active issues throughout the patient's stay (15). This would facilitate better understanding of the patient's condition and expedite the preparation of the final discharge summary. Additionally, delays in securing follow-up appointments, therapy referrals, and procedures such as echocardiograms or Holter monitoring further contribute to discharge inefficiencies. Pre-scheduling these appointments in advance, rather than waiting until the last minute, would improve the discharge process (16).

The second significant factor is the delayed preparation of discharge prescriptions, which often leads to prolonged waiting times for medications from the pharmacy. Medications should ideally be prepared the day before discharge, with final adjustments made during morning rounds, allowing the pharmacy to be notified promptly. Advanced education on medication use, such as insulin techniques or inhaler administration, should begin early in the patient's admission, rather than being left until discharge (17). Additionally, inter-hospital transfers of stable patients meeting specific criteria have been identified as another area for improvement. Transfers, particularly to institutions like the Institute of Respiratory Medicine, require careful coordination between doctors, nurses, and bed managers from both hospitals. Delays in initiating transfer requests, patient acceptance, paperwork processing, and transport arrangements have all contributed to slower transfer rates (18). Early identification of suitable transfer patients and prompt preparation of necessary documentation could enhance bed availability and facilitate smoother patient flow from the ED to the medical wards.

The third key factor contributing to discharge delays is the lack of adequate resources, particularly technological infrastructure. In the modern medical environment, technology plays a critical role in facilitating day-to-day operations. In medical wards, computers are essential for several tasks, including tracing laboratory results via the LIS and HMIS systems, managing admissions, transfers, and discharges, entering medication data by pharmacists, and preparing discharge letters or summaries by doctors (19). However, the availability of only two unreliable computers, shared by over 10 medical personnel, has significantly hindered the efficiency of discharge preparations. This shortage of functional equipment leads to delays, as staff are forced to wait to complete their tasks, prolonging the discharge process. The lack of reliable technology creates a stressful work environment for doctors and nurses, as routine tasks become time-consuming (20). Increasing the number of functioning computers in the ward would greatly enhance efficiency, allowing paperwork related to discharges to be completed in a shorter time. With improved access to computers, nurses can also stay updated on bed occupancy, discharges, bed availability, and new admissions, which would help expedite ward transfers, discharges, and patient admissions (21). To further optimize processes, the hospital management should invest in advanced computer systems and software tailored to medical settings. In addition, ensuring that staff are well-trained in using these systems and providing ongoing technical support would reduce redundant manual processes and improve overall ward efficiency (22).

The fourth significant factor contributing to discharge delays is the presence of social issues, particularly in cases involving vagabond patients. These patients often face logistical challenges, such as lack of transportation or stable housing, which prevent them from leaving the hospital after being deemed medically fit for discharge. Effective social planning is essential for coordinating post-discharge care, especially for patients requiring ongoing support, such as home healthcare or rehabilitation services (23). However, insufficient coordination and delayed involvement of social workers, case managers, and community organizations have resulted in prolonged hospital

stays for these patients. This not only contributes to bed shortages in medical wards but also strains hospital resources. To address this issue, a more proactive approach is needed, with early involvement of social support teams to ensure that discharge plans are in place well before the patient's medical care is completed. This would require collaboration with social workers, case managers, and external organizations to secure resources such as transportation, temporary housing, and financial assistance. By integrating social and logistical planning into the discharge process early in a patient's stay, hospitals can reduce delays and improve the availability of beds for incoming patients (24).

The fifth contributing factor to discharge delays is the involvement of other departments. Many patients admitted to the medical ward have complex, multidisciplinary needs beyond medical care alone. For instance, an elderly patient with uncontrolled diabetes might require surgical intervention from the Orthopaedics team for a poorly healing diabetic foot ulcer, as well as regular wound care. Delays in response from other departments in addressing these referrals have been noted, resulting in extended hospital stays. These delays in receiving specialist consultations or necessary treatments impede timely discharges, increasing the patient's risk of complications and further prolonging their hospital stay (25). In some cases, even after the involvement of other departments, a comprehensive discharge plan is lacking, requiring ongoing follow-ups by the medical team to ensure proper management.

In addition, patients whose medical issues have been resolved may develop conditions requiring intervention from surgical teams or other specialties, yet there are often delays in transferring these patients to the appropriate wards. This leads to prolonged occupancy of medical beds, reducing the availability for new admissions (26). Given the size and multidisciplinary expertise of large referral centres, such as central hospitals, it is essential to engage relevant teams early in the patient's care. Medical Officers must promptly recognize non-medical problems and initiate early referrals, ensuring that necessary laboratory tests and imaging are completed beforehand. Likewise, departments receiving referrals must respond quickly to facilitate the patient's recovery and reduce hospital stays. For cases requiring transfer to other departments—such as orthopaedic surgery or dialysis initiation—it is crucial to expedite the process by ensuring early booking, preparing documentation in advance, and coordinating with the receiving teams to ensure a smooth transition.

The sixth significant factor contributing to discharge delays is the involvement of family members. A lack of early engagement with the patient's family has been identified as a key issue, often leading to confusion, misunderstandings, and dissatisfaction. This results in delays, as families may not fully grasp the severity of the patient's condition, treatment, and recovery process (27). For instance, a patient who previously lived independently with manageable hypertension may be admitted after a stroke, resulting in loss of mobility, speech, and swallowing ability. The family, unprepared for the sudden change, may be in denial or reluctant to accept the new reality. This delay in acceptance can impede necessary preparations, such as learning essential caregiving tasks like physiotherapy, safe transfers, suctioning, Ryle's tube feeding, and dietary management. Additionally, the purchase of equipment such as walkers, wheelchairs, hospital beds, and suction machines, as well as arranging for long-term care, are often postponed, further extending the patient's stay in the ward (28). Furthermore, inadequate communication and planning can exacerbate these delays. In many cases, family members are only informed of the discharge on the day it occurs, leaving them little time to make necessary work arrangements or prepare for the patient's transfer home. Even when families are notified earlier, they may still face challenges, such as coordinating with other family members for transportation, which often results in late arrivals at the hospital. In cases where patients are ambulatory but reliant on their family for discharge, the establishment of a designated waiting lounge could help expedite the discharge process. This would allow hospital staff to clean the vacated bed and prepare for incoming patients, ensuring a smoother transition and reducing overall delays (29). The new idea is illustrated below in Figure 5.

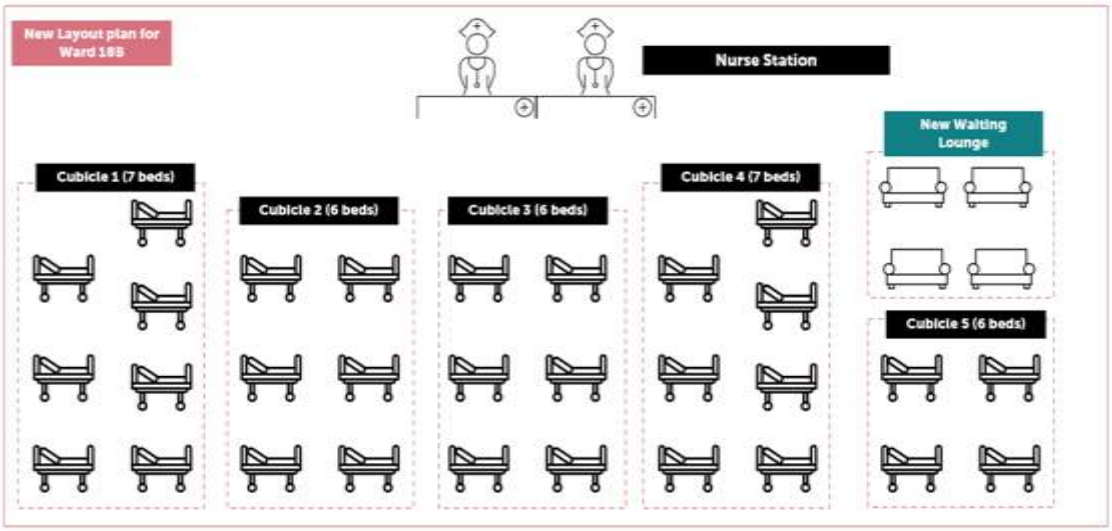

Figure 5. Proposed new ward layout plan with Waiting Lounge

Besides that, another factor contributing to discharge delays is the last-minute deterioration of a patient's condition. Despite thorough preplanning for discharge, some patients experience sudden medical setbacks just before leaving the hospital. For example, patients who have been cleared for discharge and are awaiting medications or discharge letters may develop new symptoms, such as chest pain, fever spikes, or hospital-acquired infections. In addition, adverse reactions to medications, procedures, or sudden changes in their mental or emotional state can occur (30). These complications often result in discharge cancellations, requiring the patient to remain in the ward for further treatment and reducing the availability of beds for new admissions. To minimize such occurrences, it is essential that Medical Officers conduct thorough assessments, be vigilant during examinations, and provide proactive treatment. Identifying subtle signs that may indicate early patient deterioration allows for timely intervention and escalation to higher levels of care if needed. A holistic approach to patient management is also crucial addressing not only acute medical conditions but also the patient's emotional well-being and preventing common complications, such as infections from unnecessary urinary catheters, thrombophlebitis, falls, and bed sores (31). By focusing on these preventative measures, unexpected deterioration and extended hospital stays can be reduced. However, it is important to acknowledge that, despite best efforts, sudden deterioration in stable patients is sometimes unavoidable.

A critical factor contributing to discharge delays is the shortage of manpower, particularly the absence of House Officers (32). In their absence, Medical Officers are tasked with managing all aspects of patient care, including participating in ward rounds, attending to deteriorating patients, performing procedures, drawing blood, requesting urgent scans, and communicating with family members. These tasks, aimed at ensuring patient stability, take priority over discharge preparations, making it challenging for Medical Officers to juggle both clinical responsibilities and discharge paperwork. This strain on resources has been identified as a key factor delaying patient discharge from the ward. The addition of House Officers would greatly alleviate this burden, providing an optimal learning environment for new doctors while also improving patient management (33). House Officers play a crucial role in overseeing patients who require close monitoring, particularly those with complex medical conditions or at high risk of complications. Their involvement would allow for more efficient care and discharge planning (34). Furthermore, nurses, already facing unplanned leaves or medical issues, are often forced to work extended hours beyond their allocated shifts, leading to exhaustion, errors, and patient deterioration. The lack of manpower also affects the availability of medical beds, prolonging hospital stays and creating bottlenecks in patient flow. In some instances, the absence of Healthcare Assistant has resulted in nurses taking on additional duties, such as transporting patients for x-rays or scans and distributing meals. This diversion from primary nursing responsibilities leads to suboptimal care and contributes to longer ward stays. Ensuring adequate staffing, both in nursing and management, is essential for

maintaining high-quality patient care and preventing staff burnout (35). Each level of medical personnel must fulfil their roles effectively to ensure a productive and efficient working environment, particularly in large hospital settings.

Beyond operational and logistical concerns, ethical considerations must also be acknowledged when addressing discharge delays. Ensuring patient autonomy involves timely communication about discharge plans, allowing patients and their families to participate meaningfully in decisions about post-hospital care. Delays or abrupt discharges without adequate preparation can undermine informed consent and patient dignity (36). Fairness in discharge timing is also an ethical imperative patients should not experience prolonged stays due to socioeconomic disadvantages, such as lack of transport or inadequate caregiver support. Hospitals must adopt policies that ensure equitable discharge processes across all patient demographics (37). Furthermore, the implications of these findings should prompt institutional policy reforms, such as implementing mandatory discharge planning checklists, introducing discharge coordinators, and establishing hospital-wide discharge lounges to reduce bed turnover time (38). These practices not only enhance efficiency but uphold ethical standards of care, promoting fairness, transparency, and respect in the patient journey from admission to discharge.

CONCLUSION

Improving discharge processes is essential for addressing Emergency Department (ED) overcrowding and enhancing overall hospital efficiency. This audit revealed key delay factors such as inadequate pre-discharge planning, documentation and prescription delays, limited staffing, technological shortcomings, and social or logistical barriers. To mitigate these issues, hospitals should implement specific, actionable strategies including a standardized pre-discharge checklist, early scheduling of follow-up appointments, assignment of discharge coordinators, and establishment of a dedicated discharge lounge to accelerate bed turnover. Strengthening IT infrastructure and engaging social services and families earlier in the care process can further streamline discharges. These targeted interventions, grounded in the data from this study, are not only applicable within the audited tertiary hospital but also hold potential for scaling across other wards and institutions facing similar constraints in Malaysia's public healthcare system. By embedding these measures into routine practice, hospitals can improve patient flow, reduce ED boarding times, and deliver timelier, patient-centred care.

AUTHOR'S CONTRIBUTION STATEMENT

Dr. Thaalitha Naidu led the conceptualization, data collection, and drafting of the manuscript. Dr. Nurulalnissa Abdul Kadir provided clinical oversight, facilitated hospital coordination, and contributed to manuscript review. Suriya Kumareswaran Vallasamy supervised the research methodology, guided the audit framework, and contributed to data interpretation and editing. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest. There are no financial, personal, or professional relationships that could influence the objectivity of this study.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

No generative AI or AI-assisted technologies were used in the writing, editing, or preparation of this manuscript. All content was created, reviewed, and finalized solely by the authors.

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