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Shortening emergency department length of stay: Fast track, short-stay unit and acute medical unit

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ABSTRACT

Emergency department (ED) length of stay (EDLOS) refers to the waiting time experienced by patients at various stages of the ED. It serves as an indicator of ED overcrowding. Prolonged EDLOS can lead to delays in assessment and care, negatively impacting patient satisfaction, and is associated with a poor prognosis. ED overcrowding may result in higher rates of medical errors, adverse events, and mortality. The crude mortality rate for patients with EDLOS <6 h was significantly lower than for those with EDLOS of 12–24 h and > 24 h. Multiple factors influence EDLOS before admission, including limited medical resources and a high volume of non-emergency cases. Hospitals should develop personalized strategies to reduce EDLOS by analyzing patient volumes and resource demands. In this narrative review, measures involving alternatives to ward admission from the ED such as an emergency fast track (FT), an emergency short-stay ward (ESSW)/emergency short-stay unit (ESSU), and an acute medical unit (AMU)/acute medical admissions unit (AMAU), are summarized, aiming to serve as a reference for shortening EDLOS, improving emergency care efficiency, and optimizing service quality.

1. Introduction

Emergency department (ED) overcrowding is a growing global problem,[1–4] raising concerns among patients about medical safety.[5] Effectively addressing this issue has become a top priority for many hospitals.[6] ED overcrowding may result in higher rates of medical errors, adverse events,[7,8] and mortality.[9,10] It also contributes to insufficient treatment,[11] poor prognosis,[12] increased return visit, higher likelihood of admission upon return,[13] and prolonged stay for patients,[14,15] which in turn leads to further overcrowding.[16]

ED length of stay (EDLOS) is defined as the time elapsed between initial triage registration and the actual departure from ED,[17] including the waiting time of patients at all stages and encompassing almost all aspects of the ED process.[18] It includes arrival time (triage registration), start time of treatment, disposition decision time (discharge or admission), end time of treatment, and ED departure time.[17] EDLOS is an indicator of ED overcrowding,[19] and an increase in EDLOS can lead to delays in care, diagnosis, and treatment.[3,20] In addition, it is also associated with poor prognosis in critically ill patients, as prolongation increases LOS and mortality rates.[21–23] Early admission to the intensive care unit (ICU) is more likely to contribute to positive outcomes.[24] A study on patients with sepsis admitted to the ICU from the ED showed that the crude mortality rate for patients with EDLOS <6 h was 21.4 %, which was significantly lower than that of patients with EDLOS of 12–24 h (31.9 %) and those with EDLOS >24 h (31.8 %).[21] In a study on the relationship between EDLOS and in-hospital mortality, a statistically significant association between EDLOS and in-hospital mortality was observed for EDLOS over 24 h in patients admitted to ICU (odds ratio [OR] = 1.396, 95 % confidence interval [CI]: 1.147 to 1.701; $P < 0.001$, $I2 = 0$ %).[17] For acute patients, longer ED transfer time to the ICU was associated with an increased in-hospital mortality.[25–27]

In 2004, the United Kingdom (UK) introduced the "4-h rule", stating that 98 % of ED patients must be admitted or discharged within 4 h of their visit.[28] While increasing the proportion of patients treated within 4 h, it reduced the proportion of patients staying longer than 4 h, but the total length of ED stay eventually increased.[29] In 2008, the Western Australian government announced that ED would adopt the "4-h rule": 85 % (initially) to 98 % (eventually) of patients would be discharged or admitted within 4 h of their visit.[30] While reducing mortality rates and improving emergency waiting time, it also brought about a series of problems, such as an increase in the number of patients admitted, a significant shift of ED workload to downstream wards, and increased

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pressure on nursing staff.[19] Hospitals should develop personalized methods to shorten EDLOS by analyzing patient volume and resource requirements.[31] This narrative review focuses on measures to shorten EDLOS from the ED to other medicine wards, providing alternatives to direct ward admission from the ED.

2. Literature search

This narrative review aims to discuss methods for improving prolonged EDLOS before admission. A search was conducted in both PubMed and Web of Science. Articles written in English and available in full text were included.The search returned 4684 articles, of which 4142 were selected for pre-screening after removing non-English articles and reviews. Fig. 1 shows the selection process for this review. The following query terms were used: "fast track" paired with "emergency department (title/abstract)", "emergency short-stay ward" paired with "emergency department (title/abstract)", "emergency short-stay unit" paired with "emergency department (title/abstract)", "acute medical admissions unit" paired with "emergency department (title/abstract)", and "acute medical unit" paired with "emergency department (title/abstract)". All identified articles published in the past 30 years were considered for the review, up to 19 May 2025.

Studies were included if they were original research articles, written in English, available in full text, and focused on strategies to shorten EDLOS. Eligible studies specifically addressed interventions such as fast track (FT), emergency short-stay ward (ESSW), emergency short-stay unit (ESSU), acute medical unit (AMU), or acute medical admissions unit (AMAU). Studies were excluded if the full text was unavailable, the article was written in a language other than English, or if the publication type was a commentary, editorial, opinion piece, or review article.

3. Causes of EDLOS before admission

3.1. Limited medical resources

Overcrowding in the ED is the product of internal and external factors within hospitals. The most relevant factors are a lack of hospital beds and a shortage of nursing and physician staff.[19] ED crowding is a problem for the entire hospital.[32] It is a reflection of hospital capacity issues, rather than a unique issue of the ED.[3] The waiting time for available beds in hospital wards is known as "boarding".[33] Insufficient institutional capacity leads to boarding in the ED, resulting in overcrowding.[3] The approach to boarding is mainly organizational and requires the cooperation of all departments and administrative levels for effective bed management.[33] Support for workforce redesign and solutions for downstream crowding in ICUs, other inpatient hospital wards, and post-hospital discharge destinations are needed to prevent crowding in those areas from affecting the ED.[34] Alongside increased demand, ED performance, as measured by the ability to see, treat, and either admit or discharge, has declined, and this decline has been attributed to a shortage of healthcare professionals.[35] At present, emergency medicine is facing a serious shortage of the labor force.[36]

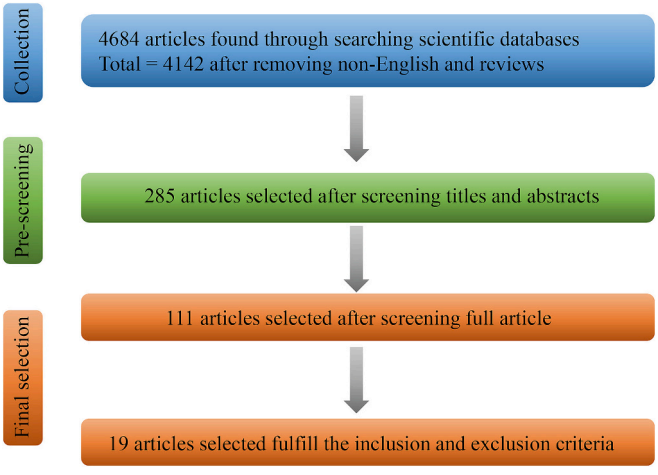

Fig. 1. Overview of the article selection process used in this narrative literature review.

3.2. More non-acute patients

Inability to effectively triage a large number of patients visiting the ED can lead to overcrowding[37] and prolonged EDLOS. There is a mix of non-acute and highly acute patients in the ED.[38] The number of non-urgent patients in the ED appears to be constantly increasing.[39] Multifaceted factors contribute to this phenomenon, including local population growth, reduced access to a primary care provider,[40] shorter wait times by going directly to the ED compared to contacting a primary care provider and then being told to go to ED,[40] as well as ED providing a "one-stop" emergency service without appointment, 24 h a day, 7 days a week.[41] The fraction of all ED visits that were judged to be non-urgent varied considerably: 4.8 %–90 %, with a median of 32 %[42]; 8 %–62 %, with an average of 37 %,[43] among others. Problems seen in ED concerning primary health care can be regarded as inappropriate use of emergency services.[44] Improvements in access to primary care services can significantly reduce the demand for low-acuity ED presentations.[45] Caring for non-acute patients leads to ED overcrowding because of the need for corresponding resources, such as medical staff.[41] Crowding causes aisle congestion, and the latter is just one of many variables that contribute to ED crowding.[46] Patients with the longest waiting time in the ED are those with less urgent symptoms, as well as those seeking treatment in the ED of large community hospitals or teaching hospitals.[37]

4. Alternatives to ward admission to shorten EDLOS

4.1. Emergency FT

In the Dutch ED, the introduction of FT, performed by a physician assistant, has significantly reduced waiting time and hospital stays.[47] This reduction was achieved without the allocation of additional staff and even led to decreased waiting and turnaround time for highly urgent patients.[47] Triage nurses divide patients into two groups based on their clinical profile: the FT group, which comprises the low to moderate urgency group, and the urgent group. The introduction of FT resulted in a significant reduction of waiting time and LOS in the low and moderate urgency group (the FT group) treated according to the FT approach, while the waiting time and LOS of the urgent group also decreased significantly. FT is the introduction of a separate patient process for simple and uncomplicated problems.[47] The allocation of physician assistants in the FT unit is a safe method to alleviate the problem of long waiting and turnaround time in the ED.[48] Patients in the ED FT unit were very satisfied with the care of the physician assistant.[48] Few patients were willing to wait longer for an emergency physician.[48]

Many emergency rooms in Switzerland have also established FT to treat patients with mild symptoms or illnesses.[49] In some places, family doctors offer mandatory after-hours services for minor emergencies.[49] In an Australian mixed adult and pediatric ED, FT helped meet the demand of increasing patient volumes, allowing low-acuity patients to be seen quickly without a negative impact on high-acuity patients.[50] In an Australian tertiary adult teaching hospital, the diversion of FT patients in the ED reduced the waiting time and LOS of discharged patients, without increasing the waiting time for admitted patients, even in EDs with fewer low-acuity patients.[51] A paired case-control design conducted at a public teaching hospital in Melbourne, Australia, showed that ED FT reduced EDLOS of non-hospitalized patients without affecting the waiting time and EDLOS of other ED patients.[52] A study on

the FT area in the ED of a tertiary care adult hospital in the United States showed that the opening of the FT area improved the effectiveness of the ED, measured by reduced waiting time and LOS, while the quality of care, measured by mortality and return visit rate, did not deteriorate.[53] FT appears to be an efficient and safe strategy to improve the management of older adults with minor complaints.[54] In a pediatric ED FT, pediatric patients who present to the ED with low acuity concerns can be effectively and efficiently cared for in a timely manner.[15] FT was implemented for patients with small injuries or benign medical conditions in a large hospital in the Champagne-Ardenne region in France, achieving a decrease in stays lasting ≥4 h.[55]

Reassessing and changing the process by which less urgent patients enter the ED provides opportunities for frontline medical staff to innovate, improve patient satisfaction, and reduce overcrowding in the ED.[37] Some studies have used lean methods to improve the efficiency of FT care in the ED and reduce LOS.[56] However, the correlation between the qualifications of FT personnel and both quality and efficiency still needs further exploration (Table 1).

4.2. ESSW/ESSU

The purpose of setting up ESSW is to reduce the boarding time of patients entering the general ward (GW) from the ED, except for those who require ICU care or are admitted to the hematology department, as the ESSW does not have the resources to provide medical services for them.[58] It can alleviate prolonged boarding time observed with hospital bed saturation and is associated with a subsequent low ICU admission rate.[58] In a study on the association between ESSW and EDLOS, patients were divided into three groups: patients admitted to ESSW and treated by the department of emergency medicine (ESSW-EM), patients admitted to ESSW and treated by other departments (ESSW-Other), and patients admitted to GWs. The EDLOS of the ESSW-EM (7.1 ± 5.4) was shorter than that of the ESSW-Other (8.0 ± 6.2, $P < 0.001$) and GW (10.2 ± 9.8, $P < 0.001$ for both). The in-hospital mortality of ESSW-EM (1.9 %) was lower than that of GW (4.1 %, $P < 0.001$).[59]

Similarly, the operation of the ESSU aims to alleviate emergency overcrowding. It cares for selected patients from clinical specialties initially admitted to the ED, and the selection is solely regulated by ED staff. Those eligible patients should not be in critical condition. After the opening of ESSU, the monthly ED bed occupancy rate dropped (mean ± standard deviation 200 ± 18 % vs 187 ± 22 %; $P < 0.001$).[60] In a study aiming to assess the impact of opening the ESSU on the ED performance of poisoned patients, the median EDLOS was reduced from 8.5 h (interquartile range [IQR]: 4.7–14) to 2.7 h (IQR: 1.6–4.6; $P < 0.0001$). The proportion of patients remaining in the ED for their entire hospital stay decreased from 515/795 (65 %) to 56/762 (7.3 %) (Absolute difference: 57 %; 95 % CI: 53 to 62 %; $P < 0.0001$).[61] The introduction of an ESSU was identified as one of the possible solutions to improve the patient flow in the ED[62] (Table 2).

4.3. AMU/AMAU

The emergence of acute medicine in the UK is aimed at improving the early management of acute inpatients.[63,64] In the AMU with the presence of a consultant, the mean LOS was significantly lower: 7.72 vs 9.06 days with a reduction (95 % CI) of 1.34 days (0.01 to 2.67), $P = 0.048$.[65] Patients not discharged within 48 to 72 h are usually transferred to the most suitable specialized ward. The AMU has consultants from other subspecialties and residents[66] and improving the efficiency of residents will benefit the ED.[67] Academic medical centers are under intense pressure to improve quality and cut costs while maintaining education.[68] The resident doctor care model can reduce medical expenses and improve the safety and quality of patient care.[68,69]

Tertiary care hospitals in South Korea have opened AMUs run by residents.[70] Acute patients are admitted to the AMU or specialized wards through the ED. Acute patients admitted to the AMU from the ED stay less than 72 h in AMU, and they are discharged or transferred to a specialized unit if longer treatment is required.[70] This resulted in a

Table 1
FT shortens EDLOS in various countries.

Country	FT Staff	Patients	Effects on EDLOS	Service time	Limitations	Ref.
Netherlands	An ED physician assistant and an emergency care nurse.	Surgical and orthopedic patients with a low or moderate level of urgency.	For the total group, for patients with low to moderate urgency levels, and urgent patients, the median LOS decreased by 12 min, 12 min, and 19 min, respectively.	Weekdays: 08:00–17:00.	Without additional resources, incorrect triage will not lead to treatment in the right unit, which may be confusing.	47
Australia	A junior ED doctor, a registered nurse, an ED consultant, and a second registered nurse when staffing numbers allowed.	Patients with low acuity conditions.	Compared with the 12-week period before the 12-week FT trial, relative reductions in average LOS for all discharged patients were 9.7 %.	Weekdays: 09:00–22:00; weekends: 09:30–18:00.	A major refurbishment increased the size of the department, confusing the impact of FT.	51
Australia	A senior emergency nurse at triage and an ED registrar or nurse practitioner.	Patients with specific non-urgent complaints.	FT patients had a significantly higher incidence of discharge within 2 h (53 % vs 44 %) and 4 h (92 % vs 84 %).	From 10:00 to 02:00 h.	Doctors are not essential for staffing, and there are certain risks involved.	52
USA	A dedicated advanced practice provider and registered nurse team.	Pediatric patients with low acuity concerns.	LOS of low acuity patients dropped 36 % (from 144 to 92 min).	Between the hours of 15:00 and 23:59.	Due to staffing constraints, FT resources would be diverted to those with life-threatening illnesses or injuries.	15
France	Two ED physicians or residents.	Patients with small injuries or benign medical conditions.	The median EDLOS decreased after intervention, from 215 min to 186 min.	Unspecified.	Staff and new beds were added to the ED, confusing the impact of FT.	55
Italy	Specialist, X-ray examination staff, and ED physician.	Older adults are admitted to the ED with less urgent or non-urgent priority.	Patients managed through the FT process had a reduction of 36 % in EDLOS, from a median of 178 min to 115 min.	FT involving specialist consultation: during the working time of specialists; FT involving an X-ray examination: 24/24 h.	After triage, patients need to visit a specialist or obtain X-ray reports before being evaluated by an ED physician. The process is relatively cumbersome.	54
USA	Patient care assistants, ED technicians, nurses, and providers.	Non-urgent patients.	The split flow model reduces overall EDLOS.	Unspecified.	Approximately 40 % of less acute patients are seen sooner than those with acute conditions after triage.	57

FT, fast track; USA, the United States of America; LOS, length of stay; EDLOS, emergency department length of stay; ED: emergency department.

Table 2
ESSW/ESSU shortens EDLOS in various countries.

Country	ESSW/ ESSU	Administration	Staff	Effects	Ref.
Korea	ESSW	It was administered separately from the ED.	Specialists and 12 nurses, apart from ED nurses.	It addresses ED crowding caused by delayed admission.	58
Korea	ESSW	ESSW-EM and ESSW-Other were administered by the department of emergency medicine and other departments, respectively.	ESSW-EM and ESSW-Other were operated by EM physicians and other physicians, respectively.	The EDLOS of the ESSW-EM group was significantly shorter than that of the ESSW-Other group and the GW group.	59
Brazil	ESSU	The selection of ESSU patients was solely regulated by ED staff.	Residents and medical staff of clinical specialties.	The monthly occupancy rate of ED beds decreased, and improved ED crowding.	60
Australia	ESSU	Senior ED nursing staff had the authority to allocate beds.	ED staff.	It helped to reduce overcrowding in the ED.	61

ESSW: emergency short-stay ward; ESSU: emergency short-stay unit; ED: emergency department; EDLOS: emergency department length of stay; ESSW-EM: patients admitted to ESSW and treated by the department of emergency medicine; ESSW-Other: patients admitted to ESSW and treated by other departments; EM: emergency medicine.

significant reduction in the median waiting time in the ED by 40 %.[70] In a study on the impact of AMU on patient prognosis, patients waiting in the ED were randomly assigned to AMU or medical wards with available beds.[71] Compared with the non-hospitalist group, the AMU hospitalist group had lower in-hospital mortality rates (4.8 % vs 9.1 %, $P < 0.001$) and ICU admissions (3.9 % vs 8.7 %, $P < 0.001$). The hospitalist group had shorter LOS (median [IQR]: 7 [4–12] vs 8 [5–13] days, $P = 0.007$) and shorter EDLOS (median [IQR]: 8.4 [6.1–12.7] vs 10.2 [6.7–19] hours, $P < 0.001$) than the non-hospitalist group.[71] Without increasing readmission rates, AMU reduces waiting time from the ED to the ward,[72] LOS,[72,73] and in-hospital mortality.[74] To date, AMUs in Australia,[75] South Korea,[76] Singapore,[77] and other regions have implemented innovative models to further enhance the quality and efficiency of medical care.

UK hospitals have introduced an AMAU to promote effective emergency admission and shorten LOS.[78,79] ED boarding reduces patient satisfaction with the entire hospitalization, not just the ED.[80] Efforts to reduce boarding and overcrowding in the ED may improve patient satisfaction.[80] According to the practice of St James' Hospital in the Republic of Ireland, emergencies in acute medicine were initially assessed by ED staff and referred by them to the "on-call" team of the day.[72] All such patients requiring hospitalization, apart from cases admitted directly to the coronary care or ICU, were admitted to the AMAU. This practice reduces LOS and wait time in the ED.[73,81] Days spent in AMAU are counted as hospital LOS.[72] The introduction of AMAU has accelerated access to emergency medical services and reduced costs[72] (Table 3).

Table 3
AMU/AMAU shortens LOS in various countries.

Country	AMU/ AMAU	Effects	Ref.
UK	AMU	It improved the early management of acute hospitalized patients.	63,64
Singapore	AMU	It improved efficiency and less fragmentation.	66
Korea	AMU	The median waiting time for the ED was significantly reduced by 40 %.	70
Netherlands	AMU	It is beneficial in improving the strain on the acute healthcare systems.	82
UK	AMAU	It promoted an efficient emergency admission process and shortened LOS.	78,79
Ireland	AMAU	It sped up access to emergency medical services.	72

AMU, acute medical unit; AMAU, acute medical admissions unit; LOS, length of stay; UK, the United Kingdom; ED, emergency department.

5. Discussions

One way to address ED overcrowding is to ensure that patients who do not need urgent care are no longer treated in the ED after initial diagnosis and treatment.[37] These patients can receive follow-up care in specialized follow-up clinics.[37]

FT is the introduction of a separate patient process for simple and uncomplicated problems. It diverts non-urgent patients effectively, enabling them to seek medical care quickly. The operating hours and periods of FT vary from country to country, but none of them operates 24 h a day, 7 days a week. FT is designed to match peak presentation times; these times often occur after regular working hours or on weekends, when non-urgent patients are more likely to seek care. Therefore, operating FT only on weekdays or during daytime hours may not be sufficient to meet patient needs, and operating hours should be adjusted according to local conditions in different regions. Introducing specialist doctors in FT is not always necessary. Managing FT by emergency medical staff is beneficial for the timely treatment of patients, but this approach is limited by available human resources. If FT personnel are fixed, there may be a risk that urgent patients may experience longer waiting times than non-urgent ones. A dynamic allocation of medical staff based on the patient volume in each area supports the rational utilization of human resources. Ensuring the timely treatment of urgent patients is of the utmost importance. While the involvement of specialist doctors may offer targeted diagnosis and treatment, they are not always available to provide services outside of their working hours. A more efficient approach may be for emergency physicians to provide initial care, followed by specialist consultation if needed. A key challenge in implementing FT lies in accurate triage, ensuring that treatment is carried out in the appropriate unit. Assigning potentially acute patients to FT can result in inappropriate treatment settings. This places greater demands on triage processes, which must rapidly and accurately identify acute conditions. However, decisions made under time pressure are not always optimal and may pose clinical risks. Team-based triage, involving both nursing and medical staff, may help address this issue. Additionally, not all medical staff may be adequately trained or suited for FT duties. The redistribution of responsibilities must be carefully considered, including who will assume the original duties of staff assigned to FT, and how to respond when a patient's condition in the FT group deteriorates rapidly. Therefore, the qualifications of FT personnel, as well as their overall quality, efficiency, and operational procedures, require further investigation and optimization.

ESSW and ESSU apply to almost all patients who are transferred from the ED to the GW, but it is up to the medical staff to determine which patients are eligible for transfer. ESSUs also accommodate patients who require observation before hospitalization or those awaiting admission when no inpatient bed is immediately available. The question of where the personnel responsible for medical care in ESSW and ESSU should come from is worth considering: should these units be managed centrally by the ED, by other departments, or jointly by ED and clinical specialty staff? Regardless of the management model, ESSW/ESSU have been shown to reduce EDLOS to some extent. Compared with treatment by other departments, patients in the ESSW treated by emergency staff experienced shorter EDLOS. This suggests that emergency physicians are capable of managing inpatient care and that it may be more efficient for

them to operate the ESSW/ESSU. The AMU focuses on the first few days of inpatient treatment, after which patients are discharged or transferred to specialized wards if further care is required. Similarly, it is important to further explore the optimal composition of the medical team to lead AMUs or AMAUs. Additionally, the impact of these units on inpatient morbidity, readmission rates, mortality, and patient or staff satisfaction warrants further investigation.

The above solutions have shortened EDLOS to some extent, but they all require corresponding management. They require a suitable number of qualified medical personnel to participate, which poses certain challenges to hospital human resource management. If emergency medical staff are allocated, these diversion methods will barely impact the doctor-patient and nurse-patient ratios. Effectively identifying urgent patients and dynamically and rationally allocating personnel based on patient volume are the basis for improving efficiency. Otherwise, chaos is very likely to occur. If medical staff are allocated from departments other than the ED, although it can reduce EDLOS to a certain extent, it is worth discussing whether it will affect the efficiency of the corresponding departments. The medical services provided by other specialties should not be compromised merely to reduce EDLOS. All medical staff need to receive training on new methods and care pathways to ensure the smoothness of medical processes. Moreover, no matter which approach is adopted, it is necessary to formulate corresponding treatment procedures for changes in patients' conditions to ensure medical quality and patient safety.

This study has some limitations. Compared with systematic reviews, narrative reviews do not follow strict methodological standards and lack a comprehensive and systematic screening and evaluation process of the literature. They rely more on the subjective judgment of the author, so their conclusions may not be sufficiently reliable.

6. Conclusions

In order to shorten EDLOS, medical institutions at all levels in various countries have made many explorations. However, hospitals should formulate tailored methods to shorten EDLOS by analyzing the number of patients, resource demands, and other relevant factors. Alternatives to ward admission from ED, such as FT, ESSW, ESSU, AMU, and AMAU, can promote emergency admission and shorten EDLOS, but they should be implemented at appropriate times and adapted to local conditions, ensuring medical safety while maximizing their effectiveness.

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Bei Huang drafted the manuscript and prepared tables. The author approved the final version of the manuscript.

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Declaration of competing interest

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