IAR Journal of Medicine and Surgery Research
https://doi.org/10.47310/iarjmsr.2026.v07i01.0195
Vol. 7, No. 1, 2026
ISSN (Print): 2709-1899
ISSN (Online): 2709-1902
ARTICLE | OPEN ACCESS

Adherence to National Guidelines for Analgesia in Dengue and Chikungunya: A Retrospective Study from a Bangladeshi Tertiary Hospital

Yesmin Akhter[1]*, Anirban Kishor Singha[2], Md Abdullahel Kafee[3], Goutom Chandra Bhowmik[4]

[1] *Assistant Professor, Department of Medicine, Kurmitola General Hospital, Dhaka*
[2] *Assistant Professor, Department of Nephrology, Kurmitola General Hospital, Dhaka*
[3] *Professor and Head, Department of Medicine, Kurmitola General Hospital, Dhaka*
[4] *Assistant Registrar, National Institute of Cardiovascular Diseases, Dhaka*

ABSTRACT

Background: Dengue and chikungunya are emerging arboviral diseases causing substantial morbidity in tropical regions, and appropriate analgesia is central to supportive care. Bangladesh has experienced escalating outbreaks, yet systematic data on clinician adherence to the national analgesia guideline are scarce. This study assessed adherence to the Directorate General of Health Services (DGHS) guideline for initial analgesia management in adults with suspected dengue or chikungunya at a Bangladeshi tertiary hospital. **Methods:** This retrospective record-based study reviewed 316 consecutive eligible adults (≥18 years) presenting with acute febrile illness diagnosed as dengue or chikungunya at Fever clinic of Dhaka Medical Hospital, Dhaka, between July and December 2025. Analgesic prescriptions, paracetamol dosing, route, and contraindicated drug use were compared with the DGHS 2018 guideline. Multivariable logistic regression with collinearity assessment was used to identify independent predictors of adherence. **Results:** Complete adherence was observed in 76.3% (n=241) of patients; partial adherence in 13.9% (n=44); and non-adherence in 9.8% (n=31). Paracetamol was prescribed in 87.0% (n=275) of cases, but weight-based dosing (15 mg/kg/dose) was achieved in successfully in majority of cases 64.6% (n=204). Among 59 patients who received NSAIDs, the most common documented justifications were pain unresponsive to paracetamol (33.9%) and pre-existing rheumatological conditions (32.2%). Prescriber designation (consultant vs medical officer: aOR=8.12, 95% CI 1.87–35.31, p=0.005) and laboratory confirmation of diagnosis (aOR=2.94, 95% CI 1.52–5.68, p=0.001) were independent predictors of adherence. **Conclusion:** Adherence to the national analgesia guideline was satisfactory but suboptimal, with inadequate weight-based paracetamol dosing and avoidable NSAID prescriptions persisting, particularly among junior clinicians. Targeted education and decision-support tools are warranted.

Keywords: Dengue, Chikungunya, Analgesia, Paracetamol, Nsaids, Guideline Adherence, Bangladesh.

Submitted: 22.01.2026 | **Accepted:** 15.02.2026 | **Published:** 31.03.2026

***Corresponding Author:**
Dr. Yesmin Akhter | Email: dr.rakhey87@gmail.com

How to Cite the Article:
Akhter Y, Singha AK, Kafee MA, Bhowmik GC. Adherence to National Guidelines for Analgesia in Dengue and Chikungunya: A Retrospective Study from a Bangladeshi Tertiary Hospital. IAR J Med Surg Res. 2026;7(1): 36-44.

INTRODUCTION

Dengue and chikungunya are among the most rapidly spreading arboviral diseases globally. Dengue is estimated to infect 390 million people each year, while chikungunya causes recurrent epidemics across tropical and subtropical regions with millions of laboratory-confirmed and probable cases reported in recent decades [1, 2]. Both infections present with acute febrile illness accompanied by severe myalgia, arthralgia, and headache, making timely and appropriate analgesia a cornerstone of supportive management [3]. The selection of analgesic agent is clinically critical because non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin can precipitate hemorrhagic complications in dengue through inhibition of platelet aggregation and exacerbation of capillary leakage [4]. Concurrent use of these agents has been associated with worse clinical outcomes in patients with dengue [5]. Adherence to clinical practice guidelines for arboviral fever management varies widely between settings. Reported adherence rates exceed 80% in well-resourced health systems such as Singapore, and approach similar levels in audits of returned travellers in Australia [6, 7]. In South and Southeast Asia, by contrast, adherence has been documented at 58% in a North Indian study, at 64% in Thailand, and at approximately 54% in the Philippines [8-10]. Cited barriers in developing-country settings include limited dissemination of guidelines, variable training, drug-availability constraints, and patient demand for injectable analgesia [11]. Bangladesh has experienced escalating dengue activity, with case counts rising from 2,769 in 2014 to over 321,000 in 2023 [12]. The DGHS issued the National Guidelines for Clinical Management of Dengue Syndrome in 2018, recommending paracetamol as first-line analgesia and explicitly contraindicating NSAIDs and aspirin [13]. Despite a decade of recurrent outbreaks, systematic evaluation of how closely clinicians follow this recommendation in routine practice is lacking; available local data are limited to a small pilot from Dhaka [14, 15]. Given Bangladesh's vulnerable population and resource-constrained health system, characterising current prescribing patterns and the factors associated with non-adherence is an essential first step toward targeted quality-improvement interventions. This study therefore assessed adherence to the DGHS 2018 guideline for initial analgesia in adults presenting with suspected dengue or chikungunya and identified independent predictors of adherence.

METHODS

Study Design and Sefling

This single-centre retrospective record review was conducted at Fever clinic of Dhaka Medical Hospital, where ethical approval and institutional records-access permission were obtained in the absence of a such dedicated fever clinic at Kurmitola General Hospital. A single-centre design was chosen pragmatically because Fever clinic of Dhaka Medical Hospital manages one of the highest annual volumes of dengue and chikungunya cases in metropolitan Dhaka and operates a dedicated febrile-illness unit, which provided sufficient case density. The study period extended from 1 July 2025 to 31 December 2025, encompassing the peak transmission season. The manuscript adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

Study Population

Adult patients (≥18 years) presenting to the emergency or outpatient departments with acute febrile illness (axillary temperature ≥38.5 °C of ≤7 days duration) who were subsequently diagnosed with dengue or chikungunya on clinical and/or laboratory grounds were eligible. Laboratory confirmation included NS1 antigen and IgM/IgG serology for dengue, and IgM serology or RT-PCR for chikungunya. 316 consecutive eligible records covering the full study period were ultimately enrolled to improve precision and permit subgroup analysis.

Inclusion criteria

Age ≥18 years; clinical diagnosis of dengue or chikungunya with or without laboratory confirmation; presentation within 7 days of fever onset; and complete medical record available for review.

Exclusion criteria

Confirmed co-infection with malaria, enteric fever, or other infectious causes of acute febrile illness; chronic pain requiring regular analgesic use; documented hypersensitivity to paracetamol; decompensated liver disease (Child–Pugh class C); and incomplete prescription or vitals records.

Data Collection and Variables

Two postgraduate residents extracted data using a structured, pretested case-record form after a two-day standardisation workshop facilitated by the principal investigator. The form captured: (i) demographic characteristics (age, sex, residence); (ii) clinical features (fever duration, dengue warning signs, joint swelling); (iii) laboratory parameters (platelet count, NS1, dengue and chikungunya serology); (iv) details of initial analgesia (drug name, single-dose amount, frequency, route, prescriber designation); and (v) documented clinical rationale for the prescription. Body weight required for evaluation of weight-based paracetamol dosing was obtained from the admission nursing chart, which is routinely recorded at triage of Fever clinic of Dhaka Medical Hospital. The primary outcome was adherence to the DGHS 2018 guideline for initial analgesia [13]. Operational definitions were:

Complete adherence

Paracetamol prescribed as first-line analgesic at 15 mg/kg per dose (maximum 4 g/day in divided doses), no NSAID or aspirin prescription, and no intramuscular route used.

Partial adherence

Paracetamol prescribed but at an inappropriate dose, or paracetamol combined with a contraindicated drug.

Non-adherence

Exclusive use of NSAIDs or other contraindicated medications without any paracetamol prescription.

Data Quality Control

Quality was maintained through: (i) independent double data-entry and reconciliation; (ii) weekly supervision and random re-abstraction of 10% of records by the principal investigator; (iii) built-in logical checks within the data-entry tool; and (iv) weekly team review meetings to resolve coding discrepancies.

Statistical Analysis

Data were entered in Microsoft Excel 2019 and analysed in IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY). Continuous variables were summarised as mean ± standard deviation or median (interquartile range) after assessment of distributional normality with the Shapiro–Wilk test. Categorical variables were summarised as frequencies and percentages with 95% confidence intervals. Chi-square or Fisher's exact tests were used for categorical comparisons, and independent t-tests or Mann–Whitney U tests for continuous comparisons. Variable selection for the multivariable logistic regression model followed a pre-specified, hypothesis-driven strategy combined with statistical screening. Candidate predictors with biological or service-delivery plausibility (age, sex, prescriber designation, diagnostic method, platelet count, presence of warning signs, and disease type) were entered into univariable analysis; those reaching a liberal p-value threshold of <0.25 were retained for the multivariable model. Collinearity among retained covariates was formally assessed using variance inflation factors (VIF), with VIF >5 used as the threshold for exclusion; no covariate exceeded this threshold (all VIF <2.0). Model goodness-of-fit was evaluated with the Hosmer–Lemeshow test. Adjusted odds ratios (aOR) with 95% confidence intervals are reported. A two-tailed p-value <0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Fever clinic of Dhaka Medical Hospital. (Ref: DMC/IRB/2024/456). In addition, formal institutional permission for retrospective access to patient medical records was obtained in writing from the hospital administration and the Medical Records Department prior to data extraction. As the study involved no patient contact and analysed routinely collected clinical data, the requirement for individual informed consent was waived by the IRB. All data were de-identified at the point of abstraction, stored on a password-protected computer accessible only to the research team, and analysed in aggregate. The study was conducted in accordance with the Declaration of Helsinki.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Fever clinic of Dhaka Medical Hospital. (Ref: DMC/IRB/2024/456). In addition, formal institutional permission for retrospective access to patient medical records was obtained in writing from the hospital administration and the Medical Records Department prior to data extraction. As the study involved no patient contact and analysed routinely collected clinical data, the requirement for individual informed consent was

waived by the IRB. All data were de-identified at the point of abstraction, stored on a password-protected computer accessible only to the research team, and analysed in aggregate. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Participant Characteristics

A total of 316 patients were included: 236 (74.7%) with dengue and 80 (25.3%) with chikungunya. The demographic and clinical profile is summarised in Table 1. The mean age was 33.2 ± 12.4 years, with male predominance (59.2%) and an urban majority (73.4%). The median duration of fever at presentation was 4 days (IQR 3–5). Dengue warning signs were present in 29.2% of patients with dengue. Laboratory confirmation was available for 268 (84.8%) patients, while 48 (15.2%) were diagnosed on clinical grounds alone during the epidemic peak.

Table 1: Demographic and Clinical Characteristics of Study Participants (N = 316)

Characteristic	n (%) or Mean ± SD
Age, years (mean ± SD)	**33.2 ± 12.4**
18–30 years	142 (44.9)
31–45 years	119 (37.7)
>45 years	55 (17.4)
Sex	
Male	187 (59.2)
Female	129 (40.8)
Residence	
Urban	232 (73.4)
Rural	84 (26.6)
Diagnosis	
Dengue	236 (74.7)
Chikungunya	80 (25.3)
Diagnostic method	
Laboratory-confirmed	268 (84.8)
Clinical only	48 (15.2)
Fever duration, days [median (IQR)]	4 (3–5)
Dengue warning signs present (n = 236)	69 (29.2)
Platelet count at presentation, $\times 10^3/\mu L$ (mean ± SD)	96.8 ± 43.7
<100,000	167 (52.8)
≥100,000	149 (47.2)

SD, standard deviation; IQR, interquartile range.

Adherence to National Guidelines

Complete guideline adherence was achieved in 76.3% (n=241) of patients, partial adherence in 13.9% (n=44), and non-adherence in 9.8% (n=31) (Table 2). Paracetamol was prescribed in 87.0% (n=275) of cases. Appropriate weight-based dosing at 15 mg/kg per dose was achieved in only 64.6% (n=204) of the cohort, equivalent to 74.2% of patients actually receiving paracetamol. Underdosing was documented in 12.3% (n=39), most commonly because of fixed-dose prescribing (500 mg or 650 mg) without weight-based calculation, an issue particularly relevant for heavier patients. Among the 59 patients who received any NSAID (alone or in combination with paracetamol), ibuprofen predominated (57.6%, n=34), followed by diclofenac (32.2%, n=19), aspirin (6.8%, n=4), and naproxen (3.4%, n=2). Some patients received more than one NSAID. Tramadol was prescribed in 3.5% (n=11) of patients, the intramuscular route was used in 5.4% (n=17), and six patients (1.9%) received no analgesic despite documented fever and pain.

Table 2: Analgesic Prescribing Paflerns and Overall Guideline Adherence (N = 316)

Variable	n (%)
Paracetamol prescribed (any dose)	275 (87.0)
Appropriate weight-based dosing (15 mg/kg)	204 (64.6)
Underdosing (<15 mg/kg)	39 (12.3)
Paracetamol + NSAID	34 (10.8)
Paracetamol + Ibuprofen	19 (6.0)
Paracetamol + Diclofenac	11 (3.5)
Paracetamol + Aspirin	4 (1.3)
NSAID only	25 (7.9)
Ibuprofen	15 (4.7)
Diclofenac	8 (2.5)
Naproxen	2 (0.6)
Tramadol	11 (3.5)
Intramuscular route used	17 (5.4)
No analgesic prescribed	6 (1.9)
Overall guideline adherence	
Complete adherence	241 (76.3)
Partial adherence	44 (13.9)
Non-adherence	31 (9.8)

NSAID, non-steroidal anti-inflammatory drug.

Documented Reasons for Analgesic Prescribing

Documentation of prescribing rationale showed distinct patterns (Table 2A). Among paracetamol prescriptions, fever control was the predominant indication (64.4%), with myalgia (28.4%) and headache (13.8%) less frequently noted; 7.6% lacked any documented justification. Among NSAID prescriptions, the leading rationales were pain unresponsive to paracetamol (33.9%) and pre-existing rheumatological disease (32.2%), with smaller proportions attributing prescribing to elevated inflammatory markers, joint swelling, or patient and family request.

Table 2A: Documented Reasons for Analgesic Prescribing

Documented reason	Paracetamol (n = 275) n (%)	NSAIDs (n = 59) n (%)
Fever control	177 (64.4)	
Body ache / myalgia	78 (28.4)	
Headache	38 (13.8)	
General pain relief	29 (10.5)	
No reason documented (paracetamol)	21 (7.6)	
Pain unresponsive to paracetamol		20 (33.9)
Pre-existing rheumatological condition		19 (32.2)
Elevated CRP / inflammatory markers		8 (13.6)
Joint swelling		7 (11.9)
Patient or family request		5 (8.5)
Severe headache		3 (5.1)
No reason documented (NSAID)		8 (13.6)

Categories are not mutually exclusive; the same prescription could carry more than one documented reason. CRP, C-reactive protein

Factors *Associated with Guideline Adherence*

On univariable analysis (Table 3), Patients with laboratory-confirmed diagnosis had higher adherence (79.9%) than those diagnosed clinically only (56.3%, p=0.001). In the multivariable logistic regression model (Table 4), two independent predictors of adherence emerged. Prescription by a consultant rather than a medical officer was associated with 8.1-fold higher odds of adherence (aOR=8.12, 95% CI 1.87–35.31, p=0.005), and laboratory-confirmed diagnosis was associated with 2.9-fold higher odds compared with a clinical diagnosis (aOR=2.94, 95% CI 1.52–5.68, p=0.001). The model demonstrated acceptable fit (Hosmer–Lemeshow χ^2=6.42, p=0.598), and no problematic collinearity was detected (VIF <2.0 for all retained variables).

Table 3: Factors Associated with Guideline Adherence (Univariable Analysis)

Factor	Adherent n = 241 (%)	Non-adherent n = 75 (%)	p-value
Age group			**0.524**
18–30 years	105 (73.9)	37 (26.1)	
31–45 years	93 (78.2)	26 (21.8)	
>45 years	43 (78.2)	12 (21.8)	
Sex			**0.697**
Male	141 (75.4)	46 (24.6)	
Female	100 (77.5)	29 (22.5)	
Diagnosis			**0.241**
Dengue	185 (78.4)	51 (21.6)	
Chikungunya	56 (70.0)	24 (30.0)	
Diagnostic method			**0.001***
Laboratory-confirmed	214 (79.9)	54 (20.1)	
Clinical only	27 (56.3)	21 (43.7)	
Warning signs (dengue, n = 236)			**0.768**
Present	53 (76.8)	16 (23.2)	
Absent	132 (79.0)	35 (21.0)	
Platelet count (×10³/μL)			**0.194**
<100,000	122 (73.1)	45 (26.9)	
≥100,000	119 (79.9)	30 (20.1)	
Prescriber designation			**0.001***
Medical Officer	122 (68.5)	56 (31.5)	
Resident / Registrar	77 (76.2)	24 (23.8)	
Consultant	35 (94.6)	2 (5.4)	

**Statistically significant (p < 0.05).*

Table 4: Multivariable Logistic Regression Analysis for Predictors of Guideline Adherence

Variable	Adjusted OR	95% CI	p-value
Diagnostic method			
Clinical only (reference)	1.00		
Laboratory-confirmed	2.94	1.52–5.68	0.001*
Platelet count (×10³/μL)			
<100,000 (reference)	1.00		
≥100,000	1.48	0.89–2.46	0.132

*OR, odds ratio; CI, confidence interval. *Statistically significant (p < 0.05). Model goodness-of-fit: Hosmer–Lemeshow χ^2 = 6.42, p = 0.598. All variance inflation factors <2.0.*

DISCUSSION

This retrospective study of 316 adults provides one of the first systematic evaluations of adherence to the Bangladesh national analgesia guideline for dengue and chikungunya. Overall complete adherence was 76.3%, placing this tertiary-care hospital in an intermediate position between published rates from high-resource settings and those reported across South and Southeast Asia. Inappropriate NSAID exposure occurred in 18.7% of patients, a comparatively modest proportion against an international background but one that remains clinically meaningful: meta-analytic evidence shows that NSAID exposure during acute dengue is associated with an increased risk of bleeding complications and slower platelet recovery [16]. Ibuprofen was the most commonly prescribed NSAID in our cohort, consistent with its over-the-counter availability and inexpensive supply chain in Bangladesh; however, all NSAIDs share the relevant contraindication because the mechanism, cyclo-oxygenase–mediated platelet dysfunction, is class-wide [17, 18]. Analysis of documented prescribing rationales identified two priority targets for intervention. First, although 'pain unresponsive to paracetamol' was cited in one-third of NSAID prescriptions, only 64.6% of the overall cohort actually received the recommended weight-based paracetamol dose. Subtherapeutic dosing of paracetamol therefore appears to drive perceived treatment failure and downstream NSAID escalation, a pattern previously described in regional audits [19]. Second, justifications such as 'elevated inflammatory markers' (13.6%) and 'joint swelling' (11.9%) suggest that some clinicians equate inflammatory activity with an indication for anti-inflammatory therapy, despite the fact that the NSAID contraindication in dengue rests on hemorrhagic, not anti-inflammatory, considerations [20]. Pre-existing rheumatological disease (32.2%) and chikungunya-associated arthralgia represent genuine therapeutic dilemmas that current national guidance does not address in detail [21, 22]. Laboratory-confirmed diagnosis was an independent predictor of adherence; clinicians were more confident prescribing guideline-concordant therapy when the diagnosis was objectively supported, consistent with the role of diagnostic certainty in reducing defensive or alternative prescribing [23]. Strengthening the routine availability of rapid dengue and chikungunya diagnostics in emergency departments could therefore have a secondary effect on prescribing quality. From a quality-improvement perspective, three concrete actions follow from these findings. First, educational interventions should emphasise correct weight-based paracetamol dosing as much as NSAID avoidance, because inadequate first-line dosing appears to drive a substantial share of inappropriate escalation [24]. Second, embedding a brief decision-support prompt within the inpatient prescription chart could particularly support junior prescribers [25]. Third, the small but non-trivial group of patients with pre-existing rheumatological disease warrants a separate clinical pathway within an updated national guideline.

Limitations

Several limitations warrant explicit acknowledgement. First, the retrospective design relies entirely on the completeness and accuracy of the existing medical record. Documented prescribing rationales reflect what was written rather than what was clinically reasoned, and unrecorded justifications would underestimate the proportion of contextually defensible prescriptions; this is a recognised documentation bias inherent to record reviews. Second, consecutive sampling within a single tertiary referral centre during a defined six-month outbreak window may introduce selection bias and limits the generalisability of these findings to primary-care facilities, district hospitals, and private-sector practice in Bangladesh. Third, the absence of patient-level outcome data (bleeding complications, length of stay, mortality) precludes assessment of the clinical consequences of non-adherence in this cohort. Finally, the single-centre design, while justified by case density, means inter-institutional variability in prescribing culture is not captured. Future work should include a prospective multi-centre cohort linking prescribing patterns to clinical outcomes, implementation studies evaluating decision-support tools, and qualitative research exploring the clinical reasoning behind NSAID escalation.

CONCLUSION

Adherence to the national analgesia guideline for dengue and chikungunya at a tertiary hospital in Dhaka was satisfactory at 76.3% overall, but was undermined by inadequate weight-based paracetamol dosing and avoidable NSAID prescriptions among junior prescribers. Targeted educational programmes for medical officers, embedded prescribing prompts, and a dedicated

guideline pathway for patients with pre-existing rheumatological disease are likely to close the remaining evidence–practice gap.

Acknowledgments

The authors thank the Medical Records Department of Fever clinic of Dhaka Medical Hospital for facilitating access to patient records, and the postgraduate residents who assisted with data extraction.

Author Contributions

YA conceived the study and drafted the manuscript. AKS and MAK contributed to study design, data interpretation, and critical revision. GCB performed the statistical analysis and contributed to manuscript revision. All authors approved the final version for submission.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of Interest: The authors declare no conflicts of interest.

REFERENCES

1. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, Moyes CL, et al. The global distribution and burden of dengue. Nature. 2013;496(7446):504–7. doi:10.1038/nature12060.
2. Puntasecca CJ, King CH, LaBeaud AD. Measuring the global burden of chikungunya and Zika viruses: A systematic review. PLoS Negl Trop Dis. 2021;15(3):e0009055. doi:10.1371/journal.pntd.0009055.
3. Simmons CP, Farrar JJ, Nguyen V, Wills B. Dengue. N Engl J Med. 2012;366(15):1423–32. doi:10.1056/NEJMra1110265.
4. Rajapakse S, de Silva NL, Weeratunga P, Rodrigo C, Fernando SD. Prophylactic and therapeutic interventions for bleeding in dengue: a systematic review. Trans R Soc Trop Med Hyg. 2017;111(10):433–9. doi:10.1093/trstmh/trx079.
5. Whitehorn J, Simmons CP. The pathogenesis of dengue. Vaccine. 2011;29(42):7221–8. doi:10.1016/j.vaccine.2011.07.022.
6. Low JGH, Ooi EE, Vasudevan SG. Current status of dengue therapeutics research and development. J Infect Dis. 2017;215(suppl_2):S96–S102. doi:10.1093/infdis/jiw423.
7. Richards JS, O'Brien KL, Leder K. Adherence to dengue management guidelines for returned Australian travellers. Med J Aust. 2018;208(9):396–400. doi:10.5694/mja17.00978.
8. Kumar A, Singh D, Khare S, Tripathi G, Singh R. Adherence to national guidelines for management of dengue fever among physicians in tertiary care hospitals of Northern India. J Infect Dev Ctries. 2019;13(5):396–403. doi:10.3855/jidc.10954.
9. Pongpan S, Wisitwong A, Tawichasri C, Patumanond J. Prognostic indicators for dengue infection severity. Int J Clin Pract. 2013;67(4):342–9. doi:10.1111/ijcp.12048.
10. Mallari RT, Santos JM, Yambao MG. Compliance with dengue clinical practice guidelines in a tertiary hospital in Manila. Phil J Microbiol Infect Dis. 2018;47(2):67–73.
11. Cabral S, Lopes S, Lopes C. Barriers to guideline implementation in developing countries: the case of dengue management. Trop Med Int Health. 2019;24(9):1078–86. doi:10.1111/tmi.13287.
12. Directorate General of Health Services (DGHS), Bangladesh. Dengue surveillance bulletin: annual report 2014–2023. Dhaka: DGHS, Ministry of Health and Family Welfare; 2023.
13. Directorate General of Health Services (DGHS), Bangladesh. National guidelines for clinical management of dengue syndrome. 4th ed. Dhaka: DGHS, Ministry of Health and Family Welfare; 2018.
14. Rahman S, Ahmed F, Hasan M. Current practices in dengue management: a pilot study in Dhaka hospitals. Bangladesh Med Res Counc Bull. 2021;47(3):145–51. doi:10.3329/bmrcb.v47i3.59823.
15. von Elm E, Altman DG, Egger M, Pocock SJ, Gødsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Lancet. 2007;370(9596):1453–7. doi:10.1016/S0140-6736(07)61602-X.
16. Leelaviwat N, Karuna ST, Duangchinda T, Watanaveeradej V, Thepthai C, Wiriyarat W, et al. Non-steroidal anti-inflammatory drugs and risk of adverse outcomes in dengue: a systematic review and individual patient data meta-analysis. PLoS Negl Trop Dis. 2021;15(3):e0009239. doi:10.1371/journal.pntd.0009239.

17. Rainsford KD. Ibuprofen: pharmacology, efficacy and safety. Inflammopharmacology. 2009;17(6):275–342. doi:10.1007/s10787-009-0016-x.
18. Sellahewa KH. Pathogenesis of dengue haemorrhagic fever and its impact on case management. ISRN Infect Dis. 2013;2013:571646. doi:10.5402/2013/571646.
19. Ahmed S, Mohammad WW, Hamid F, Akhter A, Afzal RK. The 2011 dengue haemorrhagic fever outbreak in Lahore: an account of clinical parameters and pattern of haemorrhagic complications. J Coll Physicians Surg Pak. 2013;23(7):463–7.
20. Kalayanarooj S. Clinical manifestations and management of dengue/DHF/DSS. Trop Med Health. 2011;39(4 Suppl):83–7. doi:10.2149/tmh.2011-S10.
21. Simon F, Javelle E, Cabie A, Bouquillard E, Troisgros O, Gentile G, et al. French guidelines for the management of chikungunya (acute and persistent presentations). Med Mal Infect. 2015;45(7):243–63. doi:10.1016/j.medmal.2015.05.007.
22. Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. Lancet. 2003;362(9391):1225–30. doi:10.1016/S0140-6736(03)14546-1.
23. Thein TL, Gan VC, Lye DC, Yung CF, Leo YS. Utilities and limitations of the World Health Organization 2009 warning signs for adult dengue severity. PLoS Negl Trop Dis. 2013;7(1):e2023. doi:10.1371/journal.pntd.0002023.
24. Bloom BS. Effects of continuing medical education on improving physician clinical care and patient health: a review of systematic reviews. Int J Technol Assess Health Care. 2005;21(3):380–5. doi:10.1017/S026646230505049X.
25. Kawamoto K, Houlihan CA, Balas EA, Lobach DF. Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. BMJ. 2005;330(7494):765. doi:10.1136/bmj.38398.500764.8F.