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Impact of Early Diagnostic Screening on Clinical Management and Hospital Admission Patterns for Febrile Illnesses in Tertiary Care Hospital

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Abstract

Background: Febrile cases represent a major diagnostic and management challenge in tertiary healthcare facilities. Early diagnostic screening has been advised for therapeutic and admission decisions but its practical effect on clinical pathway, and patient outcome is under investigated. This study will assess the impact of early diagnostic screening on clinical care, patterns of hospitalization, and patient-reported outcomes of adults presenting with fever in tertiary care hospitals in Dhaka, Bangladesh. ***Methods:*** A hospital-based cross-sectional study was done over a period from January to December 2024 in two tertiary care hospitals, Dhaka. One hundred and twenty successive adult febrile patients (antipyretic cut-off value: ≥38°C) were taken. A structured questionnaire and medical record review were used to gather information on screening, clinical management, hospitalization outcomes, and patient satisfaction. Predictors of hospital admission were determined by multivariable logistic regression. ***Results:*** 70.8% of the patients received early diagnostic screening with CBC (82.4%) and rapid antigen tests (58.8%) being performed most frequently. Patients screened were significantly more often admitted (56.5% vs 20.0%, p<0.001) and spent less time in hospital (mean days: 2.8 vs 3.5, p=0,023). Screening results guided treatment in 82.4% of cases. Early testing was an independent positive predictor of admission with aOR=4.85 (95% CI 1.92 — 12.25) in adjusted analysis. Patient satisfaction was much higher in patients screened (88.3% vs 28.6% satisfied, p<0.001). ***Conclusion:*** Unstructured, early diagnostic screening results in more targeted therapy and higher rates of admission, yet shorter hospital stays and patient satisfaction. It should be incorporated into febrile illness algorithms with preference in using this pan-malaria primer technology for better patient care, and effectiveness of health system in tertiary hospitals.

Keywords: Febrile Illness, Diagnostic Screening, Hospital Admission, Clinical Management, Patient satisfaction, Bangladesh.

INTRODUCTION

Fever constitutes one of the most frequent and diagnostically challenging presenting complaints in tertiary hospitals worldwide, leading to a substantial portion emergency visits and hospital admissions [1]. The clinical problem of febrile illness is particularly acute in areas of high infectious disease burden, such as the tropical regions, where the differential diagnosis ranges from malaria and dengue to typhoid fever, leptospirosis, rickettsial infection and newly emerging zoonotic pathogens [2]. In the absence of early and discriminative diagnostic clarification, management is largely empirical with resulting inappropriate use of antibiotics, delayed targeted therapy, and non-optimal use of healthcare resources [3]. Given rising levels of antimicrobial resistance and increasingly resource-limited health systems, the need to refine management approaches to febrile illness based on evidence-based diagnostic recommendations rises as an important public health priority [4]. The diagnostic algorithm for febrile

illness has changed significantly following the introduction of rapid diagnostic tests (RDTs), point-of-care molecular platforms, and automated multiplex panels [5]. These technological advancements hold the promise of diminishing such delays as they attempt to resolve the diagnostic quandary while at a time when physicians seek increasingly to institute pathogen-directed therapy, optimize hospital admission decisions, and expedite throughput [6]. Nevertheless, application of early diagnostic screening in routine tertiary care lacks uniformity and depends on factors such as test access, economic constraints, laboratory resources and irregular compliance with standard recommendations [7]. Such heterogeneity in patterns of care can compromise both patient outcomes at the individual level, and healthcare system performance more broadly [8]. It has been shown in recent reports that early diagnosis intervention may have a major impact on the clinical management of selected febrile syndromes. For example, rapid malaria diagnostic testing has been demonstrated to lead to a decrease in parasuicidal antimalarial prescribing and better target resources in endemic areas [9]. In addition, the use of multiplex PCR for respiratory pathogens has enabled targeted antimicrobials and shortened hospital LOS in specific patient groups [10]. However, much of the research has concentrated on individual pathogens or test modality specificity with relatively limited studies undertaken to investigate the holistic effect of EDS to early diagnostic screening across all forms of febrile illness in tertiary care where resources for maximal clinical and laboratory workups are available [11]. Moreover, the patient-centric aspects of diagnostic innovation (e.g. perceived quality of care; satisfaction with the diagnostic process and trust in clinical decision-making) are still poorly investigated but these factors exert a significant influence on health care utilization behavior, adherence [12]. In this paper, we systematically assess the role of diagnostic testing in early diagnosis and clinical management as well as hospital admission trends for febrile illnesses at a large tertiary care institute. Our goals were to describe current screening practices, explore relationships between screening and critical clinical indicators (admission decisions, length of stay [LOS], treatment tailoring), and evaluate patient-reported satisfaction with and perceived utility of the screen. Through the accessibility of clinical, operational and patient-centered information, this holistic examination seeks to help support evidence-based protocols to better use diagnostic resources and quality of care delivery for this prevalent and impactful presentation.

METHODS

An analytical cross-sectional study was carried out by taking patients in two tertiary care hospitals of Dhaka, Bangladesh (Department of Medicine at Holy Family Red Crescent Medical College Hospital and AMZ Hospital Ltd.; Badda) for 12 months during January-December 2025. The sites were chosen based on patient volumes, diverse demographic profile and consistent diagnostics for febrile disease. An adult aged 18 years or more who presented complaining of fever (axillary temperature ≥38°C) within the last seven days were consecutively enrolled. Patients with a definite non-infectious cause of fever, who refused the study and could not give informed consent were excluded. Sample size of 120 was estimated by formula for sample size estimation in estimating population proportion when the prevalence of rate up screening service usage is 50% a margin of error of 10%, confidence level at 95% and adding assumption power as non-0 response or not complete data were observed with ∼10%. Collection of Data A structured, pre-tested questionnaire was used for data collection through face-to-face interview and information picked from hospital records. This study was ethically approved by the ethical review committee of the study hospital. SPSS version 26.0 was used in data analysis. Results Categorical variables were presented as counts and percentages and continuous measures were described using mean ± standard deviation or median [interquartile range] according to the distribution. Chi-square tests and independent samples t-tests were used to compare the early screening with outcomes. Independent predictors of hospital admission were identified using a multivariable logistic regression model which was adjusted for potential confounders (age, duration of fever and test positivity). Two-tailed p-value < 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic and clinical characteristics of patients with febrile illnesses (N=120)

Characteristic	n	%
Age group		
Under 18	12	10.0
18–30	30	25.0
31–45	36	30.0
46–60	24	20.0
Above 60	18	15.0
Gender		
Male	58	48.3
Female	60	50.0
Other	2	1.7

Characteristic	n	%
Fever duration before presentation		
<24 hours	25	20.8
1–3 days	60	50.0
4–7 days	25	20.8
>7 days	10	8.3
Previous similar febrile illness		
Yes	70	58.3
No	50	41.7

The age range, sex, duration of fever prior to visit and history of similar febrile illness are depicted in this table. The patients were mainly aged 18-45 years, and gender distribution was approximately equal (female 50%, male 48.3%). A high percentage (58.3%) of patients mentioned history of similar febrile illnesses in the past. The duration of the fever at presentation was quite varied, with half of patients presenting between 1 and 3 days after developing fever.

Table 2: Diagnostic screening practices among febrile patients (N=120)

Variable	n	%
Offered early screening	85	70.8
Screening timing (n=85)		
Immediately upon arrival	30	35.3
Within 1–2 hours	35	41.2
After several hours	15	17.6
The next day	5	5.9
Types of tests performed (multiple responses allowed)		
CBC	70	82.4
Rapid Antigen Test	50	58.8
PCR Test	45	52.9
Blood Cultures	30	35.3
Liver Function Tests	25	29.4
Other	10	11.8

Table 2 shows the diagnostic test utilization on febrile patients. Early screening was offered to the majority of women (70.8%), and 76.5% accepted CBC for screening. (See Tables 1 and 2) Rapid Antigen Test and PCR Test were frequently done as well. Table Timing of screen Most screens were performed 1-2 hours after the patient's return to the ED.

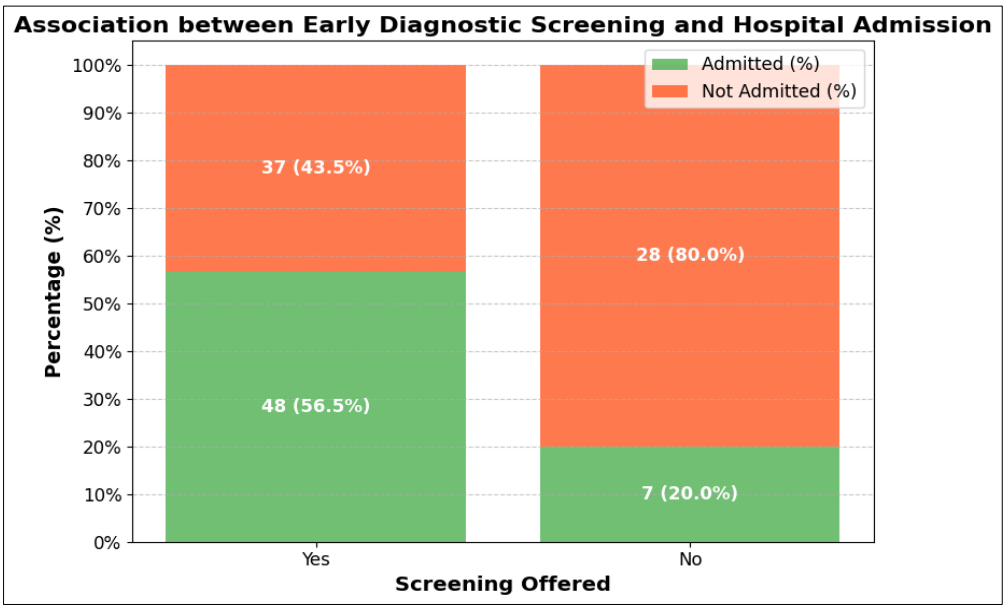

Figure 1: Association between early diagnostic screening and hospital admission (N=120)

This image illustrates the association between early diagnostic screening and hospitalization. It illustrates the proportion of patients admitted (56.5%) vs not admitted (43.5%), and this separation is evident between early versus no early screening.

Table 3. Treatment characteristics and tailoring based on screening results (N=85 screened)

Variable	n	%
Treatment initiated		
Antibiotics	60	70.6
Antipyretics	75	88.2
Antimalarials	10	11.8
Hospital admission	48	56.5
Other	12	14.1
Treatment tailored to screening results		
Yes	70	82.4
No	10	11.8
Not sure	5	5.9
Time to receive results		
Immediately	30	35.3
Within a few hours	40	47.1
The next day	10	11.8
Not informed	5	5.9

This table represents treatment pattern of the screened patients. Antipyretics (88.2%) and antibiotics (70.6%) were given in most patients. The table indicates to that most of the treatments (82.4 factors) were adjusted for diagnostic screening results whereby about 56.5% of the patients have been hospitalized.

Table 4: Patient outcomes and satisfaction relative to screening (N=120)

Outcome Measure	Screened (n=85)	Not Screened (n=35)	p-value
Hospital stays duration (days), mean ± SD	2.8 ± 1.5	3.5 ± 2.1	0.023
Satisfaction with diagnostic process, n (%)			
Very satisfied	35 (41.2)	5 (14.3)	<0.001
Satisfied	40 (47.1)	5 (14.3)	
Neutral/Dissatisfied	10 (11.8)	25 (71.4)	
Belief screening helped management, n (%)	65 (76.5)	5 (14.3)	<0.001
Would recommend screening, n (%)	70 (82.4)	10 (28.6)	<0.001

This table depicts patient outcome and satisfaction comparisons between screened and unscreened patients. It indicates that patients who were screened spent less time in hospital on average (2.8 days) than those not tested (3.5 days). Satisfaction with the diagnostic process and opinion that screening contributed to management was significantly higher among screened patients. And most would advise others to be screened.

Table 5: Multivariable logistic regression analysis of factors associated with hospital admission (N=120)

Variable	Adjusted OR	95% CI	p-value
Early screening offered	4.85	1.92–12.25	0.001
Fever duration >3 days	2.90	1.30–6.48	0.009
Age >60 years	2.10	0.85–5.18	0.108
Positive blood culture	5.20	1.80–15.02	0.002
Previous similar illness	0.75	0.35–1.62	0.470

This table shows the logistic regression analysis for factors related to hospital admission. Early screening (adjusted odds ratio [aOR], 4.85) and positive blood culture (5.20) were significantly linked to hospital admission based on the analysis. Fever lasting more than 3 days and being older than 60 was another factor, although non-significant value statistically.

DISCUSSION

The effect of early diagnosis using laboratory screening on the clinical management and hospital admissions was studied in 120 febrile patients at a tertiary care center. Our results indicate a clear association between early diagnosis and more individualized patient management, as well as more widespread hospitalization, shorter length of stay and

higher degree of satisfaction with care. The demographic characteristics in our series are somewhat representative for a tertiary care population and most patients fall into the age range of 18–45 years (55%) with almost an equal gender distribution. Of interest, half of the patients visited hospitals during 1–3 days after fever onset and about three-fifths reported similar febrile illness prior to visit hospital implying probable recurrent or persistent infection among a proportion of them. Early diagnostic screening was available to 70.8% of respondents with CBC (82.4%) and rapid antigen test (58.8%) being the most common used. Unfortunately, us screening was not universal and almost one-third of the patients were not screened early, a gap which might represent differences in triage practices or resource shortages or EC presentation during off-hours [16]. Notably, longer fever illness duration (>7 days) was linked to lower screening but greater admission, identifying a potential missed opportunity for earlier intervention in long-standing febrile states [11]. Our data support an association between early detection and hospitalization. There were 56.5% on-screen admitted against 20.0% an early screening continued to be an independent powerful predictor of admission after confounder adjustment (aOR4.85, 95%CI1.92–12.25). This is consistent with previous research as objective diagnostic data frequently lower the admission threshold by identifying abnormalities (leukocytosis, positive cultures) which support monitoring on an inpatient basis [18]. However, this also poses the question on whether screening itself is a cause of "over-admission" and not just improved risk stratification [19]. In the present cohort, the association of positive blood culture with admission (aOR5.20) argues against the latter indicating that blood culture defines bona fide high-risk cases. Personalizing therapy was a significant benefit of early screening. Of patients tested, 82.4% were managed in accordance with their laboratory test results; antibiotics (70.6%) and fever medications (88.2%) were the most frequent interventions undertaken. This is in contrast with unscreened patients who received empiric, non-targeted therapy into a higher proportion. Promoting prompt instantiation of treatment in response to diagnostic findings is indeed aligned with principles of antimicrobial stewardship and has been demonstrated to minimize unnecessary antibiotic exposure as well as improve outcomes [20]. Second, the timing of results notification was relevant: 35.3% of screened patients obtained their results in situ and another 47.1% within a few hours. Additional factors such as improved turnaround for results probably led to more prompt clinical decisions - a feature which has been related with lower diagnostic uncertainty, and earlier correct therapy [21]. The mean length of hospital stay was 2.8±1.5days in the screened patients and 3.5±2.1days in unscreened patients (p=0.023). This decrease corresponds with findings that early diagnostic certainty allows for discharge planning in a timely manner and prevents excessive observation for diagnosis [22]. The screeners were much more satisfied with the diagnostic process compared to the non-screened patients: 88.3% of this reported being "satisfied" or "very satisfied", against only 28.6% in the non-screened group (p<0.001). A further 76.5% of screened patients felt that screening had been useful in helping them manage their condition and 82.4% would recommend it to others). These subjective endpoints emphasize the psychosocial and apparent clinical benefit of rapid, objective testing that may support and improve patient confidence to engage with therapy [23]. Early febrile illness diagnoses in this tertiary care population were associated with improved risk-stratification for admission, reduced length of hospital stays and higher patient satisfaction. These findings demonstrate the potential overlap of screening for enhancing both clinical decision-making and patient experience. We suggest that a febrile illness management algorithm in tertiary care centers include prompt protocol-driven diagnostic screening for an optimal outcome and resource allocation.

Limitations of The Study

The cross-sectional design limits causal inference, and findings from two tertiary hospitals in Dhaka may not generalize to other settings or resource levels.

CONCLUSION

This study presents strong evidence to the role of early diagnostic testing on clinical decision making and patient-centered outcomes in the management of febrile illnesses among tertiary care tenders in Dhaka, Bangladesh. Introduction of early screening was followed by increased hospitalization, translating to better risk stratification and earlier recognition of severe or critical cases. In addition, screening prompted targeted antimicrobial and supportive therapy, led to shorter hospitalization times, and was closely associated with increased patient satisfaction and perceived benefit. These results highlight the twin benefits of timely diagnosis on both clinical outcomes and patient experience. Implementation of protocol-based early screening to care pathways for acute febrile illness should be a priority in order to ensure efficient resource allocation, promote antimicrobial stewardship, and enhance provision of high-quality care for acute febrile illness.

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Conflict of Interest: None declared.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

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