

AUDIT ON THE UTILIZATION OF ABDOMINAL ULTRASOUND IN DENGUE FEVER DIAGNOSIS: A TWO-CYCLE STUDY

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Abstract: Dengue fever is a viral infection transmitted by mosquitoes, prevalent in tropical and subtropical regions, including Pakistan. It can range from mild illness to severe hemorrhagic fever, and timely diagnosis is crucial for effective management, particularly during outbreaks. Abdominal ultrasound is an important tool for diagnosing dengue fever, as it can identify critical signs indicative of severe dengue. **Objective:** This audit assesses compliance with hospital guidelines for using abdominal ultrasound in suspected dengue cases before and after an intervention to improve adherence. **Methods:** A prospective audit was conducted in two cycles, with the first covering September 1, 2021, to October 1, 2021, at Akhtar Saeed Trust Hospital, Lahore. An intervention was implemented, including educational sessions and dissemination of informational materials to healthcare providers. The second audit cycle followed the same methodology to evaluate the impact of these interventions. **Results:** The first cycle revealed that out of 80 patients admitted with confirmed dengue fever, only ten patients (12.5%) underwent an abdominal ultrasound. All ultrasound reports included findings specific to dengue fever. The second post-intervention cycle showed significant improvement, with 60 patients (75%) receiving an ultrasound and all reports documenting relevant findings. **Conclusion:** The audit highlighted a substantial initial gap in using abdominal ultrasound for dengue fever diagnosis. Post-intervention, there was a notable improvement in compliance, demonstrating the effectiveness of educational initiatives. However, continued efforts are needed to achieve full adherence to guidelines.

Keywords: Dengue Fever, Abdominal Ultrasound, Audit Cycle, Pre-Intervention, Post-Intervention.

Introduction

Dengue fever, commonly known as break-bone fever, is a vector-borne disease caused by the dengue virus, which is transmitted primarily by *Aedes aegypti* mosquitoes (1). The global incidence of dengue has increased dramatically in recent decades, with a significant burden in tropical and subtropical regions such as Southeast Asia, the Western Pacific, and the Americas. As a tropical country, Pakistan is particularly vulnerable to dengue outbreaks, especially during the monsoon season when mosquito breeding conditions are optimal (2).

Dengue presents with a variety of symptoms, including high fever, severe headache, retro-orbital pain, myalgia, arthralgia, rash, and in severe cases, bleeding, shock, and organ failure (3). Early diagnosis and prompt management prevent severe outcomes (4-6). Abdominal ultrasound is pivotal in diagnosing dengue, especially in detecting complications such as plasma leakage, which can manifest as ascites, pleural effusion, and gallbladder wall thickening (7). These ultrasound findings are critical in distinguishing dengue fever from other febrile illnesses and guiding appropriate clinical management.

Given the importance of ultrasound in the clinical management of dengue, this audit assessed adherence to hospital guidelines recommending abdominal ultrasounds for all patients suspected of having dengue fever.

Aim:

To evaluate and enhance compliance with the guideline that mandates abdominal ultrasounds for all patients with

suspected dengue fever admitted through the Accident & Emergency (A&E) and Outpatient Departments (OPD).

Objectives:

1. To ensure all patients with suspected dengue fever undergo abdominal ultrasound.
2. To ensure that ultrasound reports include findings specific to dengue fever and provide a differential diagnosis.

Methodology

Study Design:

A prospective audit was conducted in two cycles.

Data Sources:

Patient records from A&E, OPD, and the Radiology Department.

Audit Periods:

- Cycle 1: September 1, 2021 - October 1, 2021.
- Cycle 2: Post-intervention, the same methodology was followed, covering a similar time frame.

Intervention:

Educational posters highlighting the importance of imaging in dengue fever were displayed in key areas, and targeted teaching sessions were conducted for doctors and other healthcare professionals.

Findings on Abdominal Ultrasound:

In patients diagnosed with dengue fever, abdominal ultrasound can reveal several key findings that are indicative of the disease's severity:



1. Gallbladder Wall Thickening: Often described as an "edematous gallbladder wall," this is one of the most consistent ultrasound findings in dengue patients. It is a sign of plasma leakage and correlates with disease severity.
 2. Pleural Effusion: This may be unilateral or bilateral and is more commonly observed in severe dengue. The pleural effusion on ultrasound indicates fluid accumulation due to increased vascular permeability.
 3. Ascites: The presence of free fluid in the peritoneal cavity is another hallmark of severe dengue and is often associated with plasma leakage syndrome.
 4. Hepatomegaly and Splenomegaly: Dengue fever can cause liver and spleen enlargement, reflecting an inflammatory response.
 5. Pericholecystic Fluid: The presence of fluid around the gallbladder, in conjunction with wall thickening, further supports the diagnosis of severe dengue.
- All the patients who underwent ultrasound during both audit cycles showed at least one of these findings, with gallbladder wall thickening being the most common.

Results

Cycle 1:

- Total number of patients with confirmed dengue fever: 80
- Ultrasound abdomen performed: 10 (12.5%)
- All 10 ultrasound reports documented findings specific to dengue fever.

Cycle 2 (Post-Intervention):

- Total number of patients with confirmed dengue fever: 80
- Ultrasound abdomen performed: 60 (75%)
- All 60 ultrasound reports documented findings specific to dengue fever. (Table 1, Fig 1)

Table 1: Comparison of USG done pre and post-cycle in dengue patients

	Ultrasound Done	No Ultrasound Done	p-value
Pre-cycle	10	70	< 0.005
Post-cycle	60	20	

A Chi-Square Test of Independence was used to analyze the pre-and post-intervention data. This indicates that there is a statistically significant difference between the pre-intervention and post-intervention groups in terms of the

proportion of patients who received an ultrasound. The intervention had a significant impact on improving compliance with ultrasound utilization in dengue fever patients.

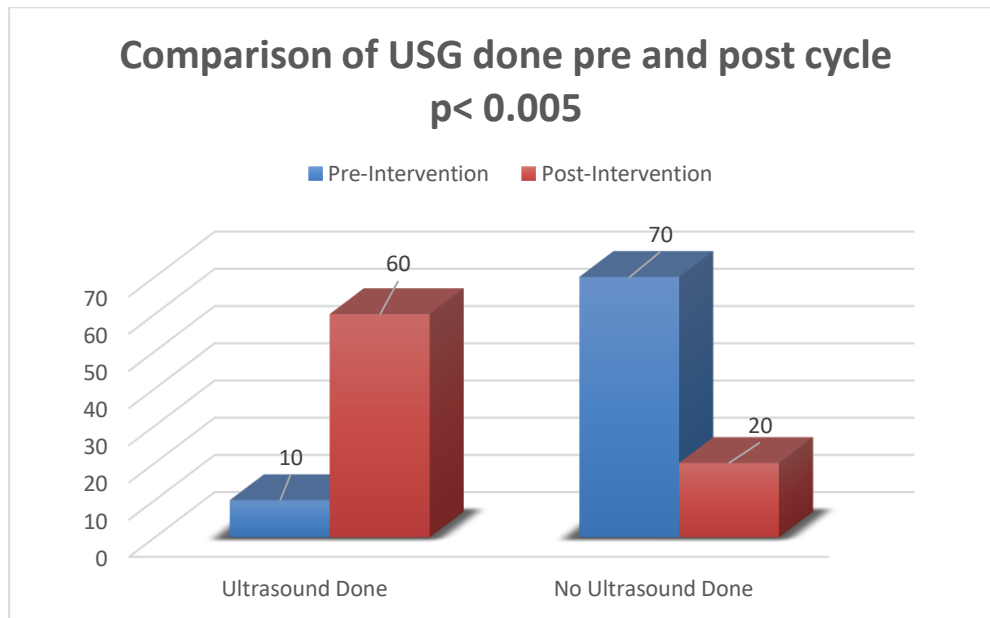


Figure 1: Comparison of Ultrasound (USG) Done Pre- and Post-Intervention:

Bar chart showing the number of ultrasound procedures before and after the intervention. Post-intervention, ultrasound procedures increased from 10 to 60, while cases without ultrasound decreased from 70 to 20. The change is statistically significant ($p < 0.005$).

Discussion

The first audit cycle identified a significant gap in the utilization of abdominal ultrasound for dengue fever

patients, potentially delaying clinical management and increasing the risk of complications. Implementing educational interventions resulted in a marked improvement

in compliance, as evidenced by the second audit cycle. This improvement underscores the importance of continuous medical education and the need to reinforce clinical guidelines regularly.

Despite the progress made, the audit reveals room for improvement, as 25% of patients in the second cycle did not undergo the recommended ultrasound. Future efforts should focus on integrating ultrasound requests into the routine diagnostic workflow for dengue fever patients, perhaps through electronic medical record prompts or mandatory fields in patient management systems.

Conclusion

This audit successfully identified and addressed a critical gap in the diagnostic process for dengue fever. The intervention, which involved targeted educational measures, led to a significant increase in the utilization of abdominal ultrasound, thereby improving patient care. Ongoing audits and continued education are necessary to sustain and further enhance adherence to guidelines.

Recommendations1. Sustain and expand the educational efforts, including mandatory training sessions for all new healthcare staff.

2. Implement a system of automated prompts in electronic health records to ensure that abdominal ultrasound is considered for all patients with suspected dengue fever.

3. Conduct periodic follow-up audits to monitor guideline adherence and make necessary adjustments.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.

It is approved by the department concerned.

Consent for publication

Approved

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Not applicable

Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

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Concept & Design of Study, Data Analysis, Final Approval of version

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Concept & Design of Study, drafting, data collection

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