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Dengue in Pediatric Populations: Challenges and Management Strategies

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Abstract

Dengue fever, caused by the dengue virus (DENV), is a significant public health concern, particularly in pediatric populations in tropical and subtropical regions. Children are at higher risk of severe dengue due to their developing immune systems and diagnostic challenges. This review synthesizes current literature on the epidemiology, clinical manifestations, diagnostic difficulties, and management strategies for dengue in children. It highlights the role of obesity as a risk factor, the impact of maternal immunity, and the need for improved diagnostic tools and vaccines tailored for pediatric use. With 27 references, this article aims to guide healthcare professionals, particularly nurses, in addressing the unique challenges of pediatric dengue.

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Introduction

Dengue is a mosquito-borne viral disease transmitted primarily by Aedes aegypti. The World Health Organization (WHO) estimates 390 million dengue infections annually, with children bearing a significant burden due to severe manifestations like dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS) [1]. Pediatric dengue presents unique challenges, including atypical symptoms, rapid progression to severe forms, and difficulties in early diagnosis [2]. This review, authored by Abha Chaorsiya, examines the complexities of dengue in children,

focusing on epidemiology, clinical features, risk factors, diagnostic approaches, and management strategies, drawing from 27 peer-reviewed sources.

Epidemiology of Dengue in Pediatric Populations

Dengue is endemic in over 100 countries, with Asia and Latin America reporting the highest pediatric cases [3]. Children aged 1–9 years are particularly vulnerable, with hospitalization rates for severe dengue exceeding those of adults [4]. In India, dengue outbreaks are seasonal, peaking during monsoon periods, and children account for 30–50% of cases in endemic areas [5]. The rise in pediatric dengue is linked to urbanization, climate change, and increased mosquito breeding sites [6].

Clinical Manifestations

Pediatric dengue presents with a spectrum of symptoms, from mild fever to life-threatening DHF and DSS. Common symptoms include high fever, headache, myalgia, and rash, but children may also exhibit atypical signs like abdominal pain, vomiting, and lethargy, complicating diagnosis [7]. Severe dengue is characterized by plasma leakage, bleeding, and organ dysfunction, with children at higher risk due to immature vascular and immune responses [8]. Obesity has been identified as a risk factor for severe dengue in children, increasing the odds of severe outcomes by 38% (Odds Ratio = 1.38; 95% CI: 1.10, 1.73) [9].

Risk Factors

Several factors exacerbate dengue severity in children:

- **Obesity:** Obese children have heightened immune responses, leading to worse prognosis [9].
- **Maternal Immunity:** Maternal dengue antibodies can enhance severe dengue in infants via antibody-dependent enhancement (ADE) [10].
- **Secondary Infections:** Prior exposure to a different DENV serotype increases the risk of DHF/DSS [11].
- **Age:** Younger children (<5 years) are more prone to DSS due to underdeveloped immune systems [12].

Diagnostic Challenges

Diagnosing dengue in children is challenging due to nonspecific symptoms and limited access to advanced diagnostics in resource-poor settings. Common tests include NS1 antigen detection and IgM/IgG ELISA, but these have variable sensitivity in children [13]. RT-PCR, while accurate, is costly and unavailable in many endemic areas [14]. Misdiagnosis with other febrile illnesses like malaria or typhoid is common, delaying treatment [15]. Nurses play a critical role in early recognition of warning signs, such as persistent vomiting and mucosal bleeding [16].

Management Strategies

Management of pediatric dengue focuses on supportive care, as no specific antiviral therapy exists. Key strategies include:

- **Fluid Management:** Judicious fluid replacement is critical to prevent plasma leakage and shock. WHO guidelines recommend crystalloids for initial resuscitation [17].
- **Monitoring:** Regular monitoring of hematocrit, platelet count, and vital signs is essential, particularly in severe cases [18].
- **Nursing Care:** Nurses are pivotal in administering fluids, monitoring for warning signs, and educating families on mosquito control [19].
- **Vaccination:** The Dengvaxia vaccine is approved for children aged 9–16 in endemic areas but is limited by serostatus requirements [20]. Research into pediatric-safe vaccines is ongoing [21].

Challenges in Pediatric Dengue Control

- **Vaccine Limitations:** Current vaccines are not universally safe for children, especially seronegative individuals [22].
- **Vector Control:** Community-based mosquito control programs are inconsistently implemented [23].
- **Healthcare Access:** Rural areas lack trained personnel and diagnostic facilities [24].
- **Public Awareness:** Low awareness of dengue prevention among caregivers hinders early intervention [25].

Future Directions

Future efforts should focus on:

- Developing affordable, child-friendly diagnostics [26].

- Creating safe and effective vaccines for all pediatric age groups [27].
- Strengthening nursing education on dengue management to enhance early detection and care [19].

Conclusion

Pediatric dengue remains a global health challenge, with children facing higher risks of severe outcomes due to physiological and diagnostic complexities. Nurses, as frontline caregivers, are crucial in managing cases and educating communities. This review underscores the need for targeted research, improved diagnostics, and accessible vaccines to reduce the pediatric dengue burden.

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