ISSN 1978-6743
E-ISSN 2477-3948
Jurnal Ilmiah Kesehatan
(Journal of Health Science)
Fakultas Keperawatan dan Kebidanan | Universitas Nahdlatul Ulama Surabaya

The Determinant Factors in Managing Dengue Hemorrhagic Fever During the Covid-19 Pandemic: A Literature Review

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ARTICLE INFORMATION

Received: May 17, 2022
Revised: June 21, 2022
Available online: August 2022

KEYWORDS

COVID-19 Pandemic; Dengue High Fever; The speed of health service

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A B S T R A C T

During the COVID-19 Pandemic, differentiating tropical infectious diseases and COVID-19 can be challenging due to overlapping clinical presentations. Fever and nonspecific symptoms in early COVID-19 may be challenging to distinguish from dengue hemorrhagic fever (DHF) and malaria because respiratory signs may be absent or manifest later in the disease course. This literature review analyzes the determinant factors in managing DHF during the COVID-19 Pandemic. This paper was a systematic literature review of national and international journals in the Google Scholar and PubMed databases from 2019 to 2022. We used the PICOS framework to find articles. The Indonesian and English keywords were the speed of health service, dengue hemorrhagic fever, and COVID-19. There were two included studies in this systematic review. The results showed that during the Covid-19 Pandemic and the dengue epidemic, a triage strategy was crucial to detect Covid-19 that could potentially be misdiagnosed as DHF. In addition, the first delay in seeking care treatment for dengue infection was due to financial constraints and previous dengue infection. Moreover, the second delay was because of the availability of transportation, traffic density, and residency location. Furthermore, the third delay was because of the hospital's capacity. Thus, the determinant factors of managing Dengue Hemorrhagic Fever during the COVID-19 Pandemic were the similarity of the signs and symptoms of dengue fever with Covid-19, financial aspects, transportation factors, the hospital distance, and hospital capacity.

INTRODUCTION

Dengue fever and coronavirus disease 2019 (COVID-19) has begun to overlap, especially in tropical and subtropical regions. It is due to the high prevalence of dengue fever in these regions during the COVID-19 Pandemic (Agudelo Rojas, Tello-Cajiao, and Rosso, 2021). Dengue Hemorrhagic Fever (DHF) is an acute epidemic disease caused by a virus transmitted by Aedes aegypti and Aedes albopictus. The symptoms from mild to high fever, headaches, pain in the eyes, muscles, and joints, and spontaneous bleeding. Dengue fever can appear throughout the year and can affect all age groups. In addition, the course of DHF is speedy. Adequate DHF management can reduce the complications, namely Dengue Shock Syndrome and mortality (Heris Santy and Arminah, 2015)

World Health Organization (2011) estimates around 50-100 million annually. DHF is the leading cause of mortality and morbidity in Southeast Asia, with 57% occurring in Indonesia. Furthermore, its incidence in Indonesia until July 2020 reached 71,633. However, its number was lower compared to 2019, with 112,954 cases (Indonesian Ministry of Health, 2020). During the Covid-19 Pandemic in early 2020, the Ministry of Health Republic of Indonesia recorded more than 65,000 cases of dengue fever throughout

https://doi.org/10.33086/jhs.v15i02.2233

Indonesia. There were 100 to 500 cases of dengue fever per day in 2020. Moreover, the death rate for dengue fever was almost 400 people. It is a challenge in the Covid-19 Pandemic, especially for individuals in malaria-endemic areas (KPC PEN, 2020).

People avoid medical care during the COVID-19 Pandemic. The anxiety about COVID-19 transmission in health facilities makes individuals with chronic diseases unable to control their illnesses. They also delay complaints, so the risk of complications increases. The speed of health services during the Pandemic may experience an extended time due to screening for COVID-19, whether a rapid test or a CT scan (Kompas, 2020b). Confirmed cases of COVID-19 in the West Kalimantan region amounted to 1,675 people, 1,335 cured (79.70%), and 21 dead (Kumparan, 2020). These conditions can impact the speed of managing DHF.

The rapid spread of COVID-19 and DHF in the Pandemic poses a severe threat to human health and severely impacts public health. Therefore, adequate management is crucial to increase patient recovery. Thus, the researchers conducted a literature review on determinant factors in handling DHF cases during the COVID-19 Pandemic.

METHOD

This paper was a systematic literature review of national and international journals in the Google Scholar and PubMed databases. Authors searched literature sources by entering keywords and selected journals based on the inclusion and exclusion criteria. The population was all journals with the determinants of the speed of service for DHF. Furthermore, the sample was journals about the determinants of managing DHF during the COVID-19 Pandemic. We used the PICOS framework to find articles. The framework consists of the population/problem to be analyzed in scientific work, intervention or action taken on the problem, comparison from other management, outcomes or results obtained in previous studies that follow the themes of the literature review, and study design used to review.

Table 1. Inclusion and exclusion criteria with format PICOS

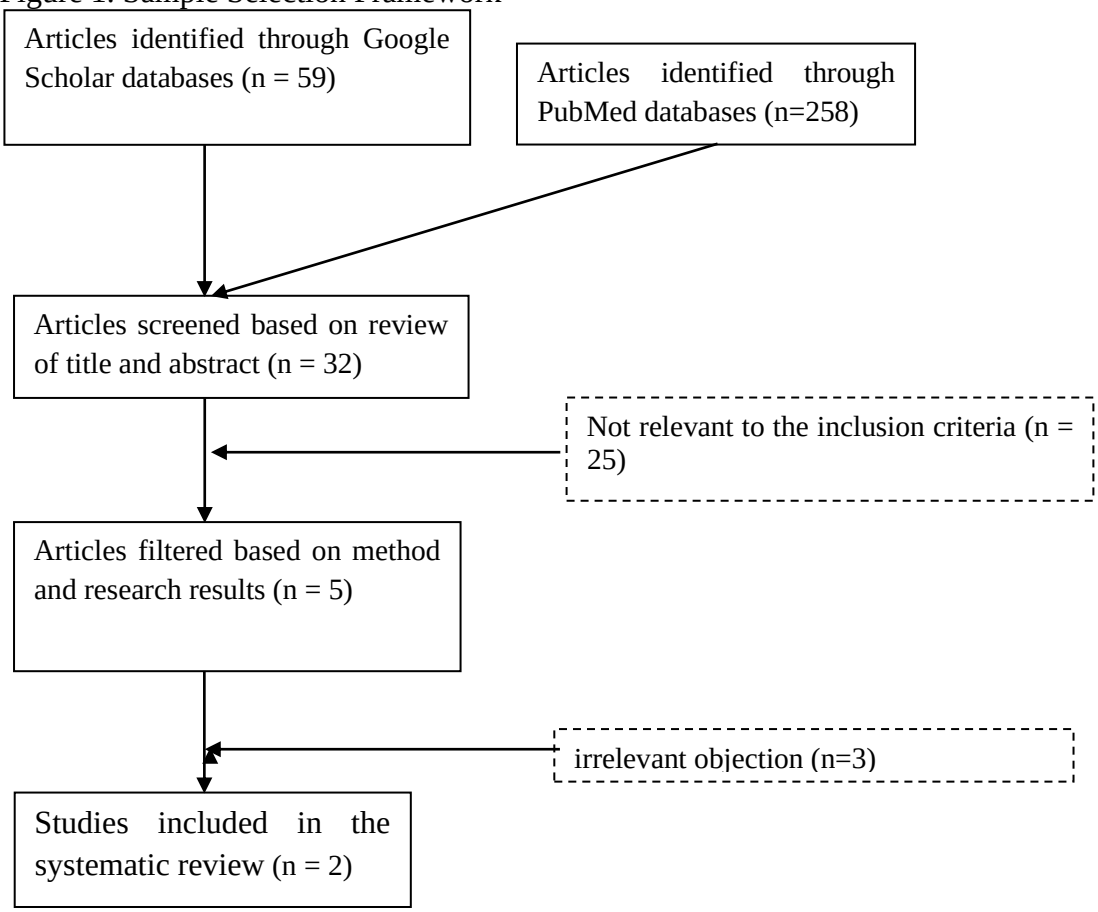
Criteria	Inclusion	Exclusion
Population/problem	Individuals with DHF in the COVID-19 Pandemic	
Intervention	No intervention	
Comparison	No comparison	
Outcome	Managing DHF in the COVID-19 pandemic	
Study design	Descriptive study and Mixed Method Study	
Publication years	*Post*-2019	
Language	English, Indonesian	Another language English and Indonesian

We initially searched articles using Google Scholar and PubMed from 2019 to 2022. We used keywords and Boolean operators (AND, OR NOT or AND NOT) to expand or specify the search, making it easier

https://doi.org/10.33086/jhs.v15i02.2233

to determine the used articles. The Indonesian and English keywords were the speed of health service, dengue hemorrhagic fever, and COVID-19. There were 317 articles in national and international journals with the keywords. Furthermore, diagram 1 shows the sample selection framework in this literature review.

Figure 1. Sample Selection Framework



RESULT

The reviewed articles were two studies with different journals, titles, number of samples, places of study, and duration. Still, both had an overview of the determinant factors of managing DHF during the COVID-19 Pandemic. The types of research from the two journals were qualitative and mixed method. Table 1 summarizes the details of both.

https://doi.org/10.33086/jhs.v15i02.2233

Table 1. The Characteristics of the articles reviewed

Author / Years	Title	DOI	Objective	Method	Results
(Wee *et al.*, 2020)	Experience of a Tertiary Hospital in Singapore with Management of a Dual Outbreak of COVID-19 and Dengue	https://doi.org/10.4269%2Fajtmh.20-0703	To describe how the triage strategy to eliminate DHF patients from Covid-19 patients	Observational research in Tertiary Hospital in Singapore from January 2020 to May 2020 in the Emergency Department (ED)	A triage strategy that receives febrile patients with viral prodromal and no epidemiology COVID-19 risk to designated wards for COVID-19 testing over two months successfully reduced the risk of healthcare-related transmission from undetected cases during the dual outbreaks of COVID-19 and dengue fever.
(Ligsay *et al.*, 2021)	"We Tried to Borrow Money, but No One Helped." Assessing the Three-Delay Model Factors Affecting the Healthcare Service Delivery among Dengue Patients during COVID-19 Surge in a Public Tertiary Hospital: A Convergent Parallel Mixed Methods Study	https://doi.org/10.3390/ijerph182211851	To describe the delay in care among parents of the patients seeking treatment for dengue and examine the factors affecting the severity of dengue (dengue with warning signs; severe dengue)	The study used a convergent parallel design mixed-method approach using Key Informant Interviews (KII) and a survey guided by the Three-Delay Model among 24 respondents at the National Children's Hospital (NCH).	Results showed that the first delay in seeking care treatment for dengue infection was due to financial constraints and previous dengue infection. In addition, the second delay was because of the availability of transportation, traffic density, and residency location. Furthermore, the third delay was because of the hospital's capacity. Moreover, the bivariable analysis showed that travel time from home to NCH, health care service from previous health facilities, and parents' educational background played a role in the severity of dengue infection.

DISCUSSION

Tropical areas have a high prevalence of the arboviral disease. During the COVID-19 Pandemic, differentiating tropical infectious diseases and COVID-19 can be challenging due to overlapping clinical presentations. Fever and nonspecific symptoms in early COVID-19 may be challenging to distinguish from dengue fever and malaria because respiratory signs may be absent or manifest later in the disease course (Wee *et al.*, 2020). A study by Wee et al. (2020) examined the cases of dengue fever during a pandemic. The study explained that during the Covid-19 Pandemic and the dengue epidemic, a triage strategy was crucial to detect Covid-19 that could potentially be misdiagnosed as DHF. The study suggested that adherence to strict triage algorithms to differentiate disease is essential for infection prevention and control. In addition, the likelihood of coinfection, although low, needs to be eliminated. Similar clinical manifestations shared by Covid-19 and dengue fever have raised concerns, especially in dengue-endemic countries with limited resources and diagnostic challenges.

In addition, the cross-reactivity of the immune response in this infection is an emerging concern, as pre-existing DENV antibodies can potentially influence Covid-19 via antibody-dependent enhancement (ADE). An Italian study found that Covid-19 patients presented with erythematous skin, rash, urticaria, and vesicles. Those skin manifestations were also reported in Madrid. Thus, skin manifestations, including rash or petechiae, increase the challenge of differentiating dengue and Covid-19 in dengue-endemic areas. In Indonesia, there are no reports of misdiagnoses between Covid-19 and DHF in the literature. However, there has been an increase in cases of dengue fever in the country. There have been 68,000 cases since 21 June 2020 (Li *et al.*, 2020). Furthermore, the Ministry of Health Republic of Indonesia in early 2021 noted that cases of dengue fever reached 100 to 500 incidences per day.

Wee et al. (2020) found that tertiary hospitals in dengue-endemic countries competed with Covid-19 during the dengue epidemic. Dengue fever became the primary differential diagnosis in a small proportion of Covid-19 patients, likely because of the early availability of chest imaging and basic diagnostic testing at the triage. Therefore, in most cases, clinicians could differentiate between dengue hemorrhagic fever and Covid-19. However, there was potential for dengue misdiagnosis in the minority of unexpected Covid-19 cases without epidemiological risk factors and dengue-compatible clinical syndromes (fever, thrombocytopenia, and absence of pulmonary infiltrate). It is due to the false-positive dengue IgM serology by Rapid Diagnostic Tests (RDT). A triage strategy in admitting febrile patients with viral prodromal and no epidemiological risk for COVID-19 to designated wards for COVID-19 testing over two months reduced the risk of healthcare-associated transmission.

In addition, Ligsay et al. (2021) conducted a study at the National Children's Hospital (NCH) located in Quezon City, a special tertiary and training hospital under the Department of Health (DOH) in the Philippines that provides care to children. Data collection was from February to March 2021 during the

COVID-19 community quarantine restrictions in Metro Manila. The study described the delay to care among parents of patients seeking treatment for dengue infection in Quezon City, the Philippines, using the Three-Delay Model. In addition, it determined and estimated the effect of the time-delay factors on the patients' dengue infection severity. The study was carried out on 24 dengue patients. The parents in the study had an average age (±SD) of 33.8 (±8.3) years old, did not go to college (63%), and were primarily residents of Quezon City (63%). In addition, most patients were 0-12 years old (67%) and females (63%). Furthermore, they were of low socioeconomic class or had an average household income of PHP 0–10,000.00 (68%). Figure 1 presents the factors affecting the delay to care among parents of the patient's seeking treatment for dengue infection (Ligsay *et al.*, 2021).

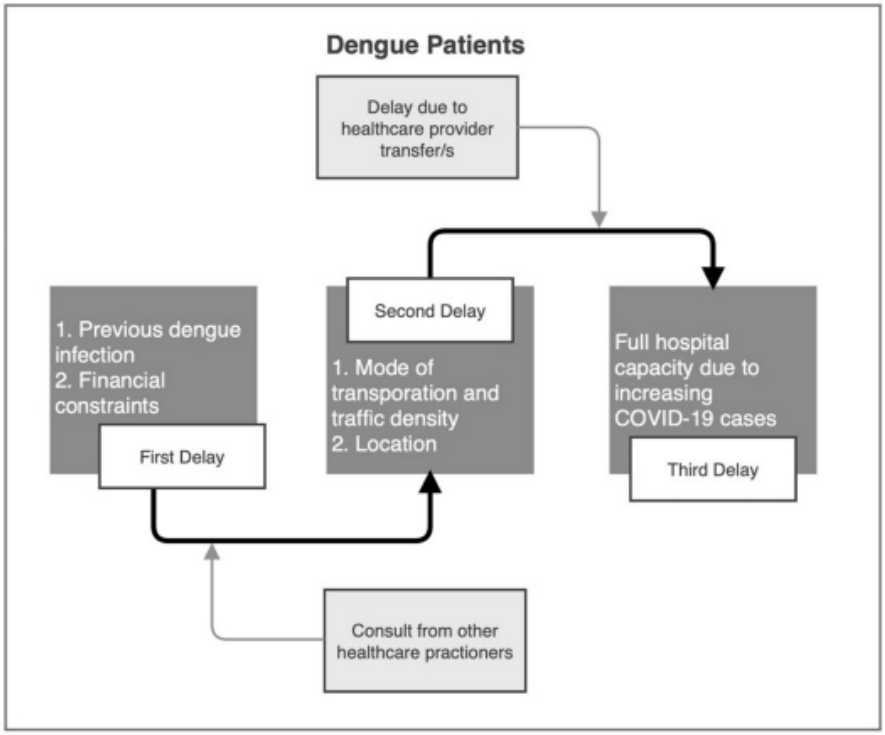


Figure 1. Three-Delay model for the qualitative assessment of delay to care among parents of the patient's seeking treatment for dengue infection (Ligsay *et al.*, 2021).

The study results found that the first delay among most parents of patients seeking treatment for dengue infection was due to the inability to cover the costs of hospitalization or medical treatment. Thus, it led to their hesitancy to bring their child to the hospital for treatment. However, most parents immediately brought their child to the nearest health facility when the patient's symptoms worsened. In addition, another first delay was due to a previous dengue infection. Parents with previous dengue infection hastened the decision-making during their child's illness.

Furthermore, the availability of transportation, traffic density, and residency location was second delay factors affecting the healthcare service delivery among Dengue Patients during COVID-19. Moreover, the

https://doi.org/10.33086/jhs.v15i02.2233

third delay was full hospital capacity due to increasing COVID-19 cases. NCH was not their first-choice health facility because it is not near their residence. Most parents opted for NCH because of many hospital refusals due to increasing COVID-19 cases, leading to some hospitals operating at and above total capacity. The parents were also aware that NCH might not immediately administer proper treatment to their child because of COVID-19 cases, but they still waited for their child to get treated even though it took them many hours (Ligsay *et al.*, 2021).

Delays or errors in diagnosis can lead to inadequate treatment that harms patients and health workers without appropriate personal protective equipment (PPE). A diagnostic test with high specificity is crucial for diagnosing dengue infection quickly and accurately calculated from when the patient arrives until treatment. A good response time for patients is 5 minutes. The factors affecting response time were the number of personnel and other supporting components such as laboratory, radiology, pharmacy, and administrative services. On-time response in the hospital is when the time required does not exceed the standard time (Fadhilah, Harahap, and Lestari, 2015). Delays in identifying the early symptoms, be it from dengue fever, coronavirus, or other causes, will affect the speed of treatment and the rate of recovery.

CONCLUSION

The determinant factors of managing Dengue Hemorrhagic Fever during the COVID-19 Pandemic were the similarity of the signs and symptoms of dengue fever with Covid-19, financial aspects, transportation factors, the hospital distance, and hospital capacity.

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