Original Article

JHSMR Journal of Health Science and Medical Research

Severe Leptospirosis Following Heavy Flooding: A Case Series from a Tertiary Hospital in Southern Thailand

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Received 13 March 2026 ● Revised 18 September 2026 ● Accepted 28 September 2026 ● Published online 27 October 2026

Abstract:

Objective: To describe the clinical characteristics, management, and outcomes of patients with severe leptospirosis following heavy flooding.

Material and Methods: We conducted a retrospective descriptive case series of six adult patients with polymerase chain reaction (PCR)–confirmed severe leptospirosis admitted to a tertiary hospital in Southern Thailand after a heavy flood. Demographic data, exposure history, clinical presentation, laboratory findings, management, and outcomes were reviewed from medical records.

Results: All six patients were adults (median age 41.5 years, range 19–70); five were male. Five patients reported direct floodwater exposure. The incubation period ranged from 1–5 days. Common symptoms were fever and myalgia. Severe manifestations included acute kidney injury (4/6), pulmonary hemorrhage (4/6), shock requiring vasopressors (5/6), and respiratory failure requiring mechanical ventilation (5/6). All cases were PCR-positive for *Leptospira*. Ceftriaxone was the main antibiotic regimen. One patient died, yielding a case-fatality rate of 16.7%.

Conclusion: Severe leptospirosis after heavy flooding can rapidly progress to multiorgan failure, particularly pulmonary and renal involvement. Early recognition and prompt antibiotic therapy with intensive supportive care are crucial to improve outcomes.

Keywords: heavy flood, intensive care, leptospirosis, multiple organ failure

This paper is part of the "Hat Yai Flooding 2025" collection
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J Health Sci Med Res 2026;44(6):e20261478
doi: 10.31584/jhsmr.20261478
www.jhsmr.org

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Introduction

Leptospirosis is an important zoonotic infectious disease and a significant public health concern, particularly in tropical and subtropical regions. Pathogenic species of the genus *Leptospira* are transmitted to humans through contact with water or soil contaminated with the urine of reservoir animals, including rodents, cattle, buffaloes, and dogs[1,2]. Thailand is endemic for leptospirosis, with a marked increase in incidence during the rainy season and following flooding events[3,4].

Although most cases are mild and self-limited, a subset of patients develop severe leptospirosis characterized by multiorgan failure, including acute kidney injury, severe hepatitis, pulmonary hemorrhage, shock, and acute respiratory distress syndrome. These severe manifestations are associated with high mortality, particularly in patients with delayed diagnosis and treatment. Reported case-fatality rates range from 5% to 40%, depending on disease severity and healthcare capacity[5,6].

The World Health Organization estimates that leptospirosis accounts for more than one million cases and approximately 60,000 deaths annually worldwide. Countries in Southeast Asia, including Thailand, have a high disease burden, with a seasonal association with heavy rainfall and flooding[1,2]. Major risk factors include exposure to stagnant floodwater, wading without protective equipment, agricultural activities, and the presence of skin wounds. The organism can enter the body through abraded skin, conjunctiva, or mucous membranes. Increasingly, outbreaks have also been reported in urban settings due to inadequate sanitation and environmental management[2,7].

Severe leptospirosis typically presents with high-grade fever, headache, and myalgia, followed by complications such as acute kidney injury, jaundice with renal failure (Weil's disease), pulmonary hemorrhage, and shock. Pulmonary hemorrhage is particularly associated with increased mortality[5,8]. Diagnosis relies on clinical suspicion combined with epidemiologic risk factors and laboratory confirmation, including IgM ELISA, microscopic agglutination test (MAT), or polymerase chain reaction (PCR). Early administration of appropriate antibiotics, such as penicillin, ceftriaxone, or doxycycline, together with aggressive supportive care, including renal replacement therapy, mechanical ventilation, and intensive care unit management, is essential to improve outcomes[1,5].

Southern Thailand, particularly the Hat Yai district in Songkhla province, experiences recurrent severe flooding each year. The flood event affected the entire Songkhla province for more than two months, from 21 November 2025 to 31 January 2026, with water levels reaching up to 4 meters in severely affected districts. This resulted in widespread residential flooding, prolonged exposure to stagnant contaminated water, disrupted transportation, and delayed access to healthcare services. During this period, Hatyai Hospital observed a marked increase in patients presenting with acute febrile illness after floodwater exposure, with 262 confirmed leptospirosis cases recorded during the disaster period. Urban flood exposure places a large proportion of the population at increased risk of infection. Hatyai Hospital, a tertiary care center, has observed an increasing number of patients with severe and complicated leptospirosis following flood events. However, clinical data describing patient characteristics, management, and outcomes of severe leptospirosis in the context of urban flooding in Southern Thailand remain limited. Therefore, this study describes the clinical characteristics, management strategies, and outcomes of patients with severe leptospirosis admitted to Hatyai Hospital following a major flood event, in order to enhance clinical knowledge and inform public health preparedness in flood-prone settings.

Material and Methods

Study design and setting

This retrospective descriptive case series was conducted at a tertiary referral hospital in Southern Thailand, during the major flooding event affecting Songkhla province

between 21 November 2025 and 31 January 2026. The study period covered admissions during and immediately after a major flooding event.

Participants

Adult inpatients with PCR-confirmed leptospirosis who met criteria for severe disease (organ failure, Intensive care unit [ICU] admission, shock, pulmonary hemorrhage, or ARDS) were included. A total of 262 patients with confirmed leptospirosis were admitted, of whom 27 (10.30%) developed severe disease selected case series of six patients with sufficiently complete medical records.

Data collection

Medical records were reviewed using a standardized case record form. Extracted variables included demographics, comorbidities, flood exposure history, clinical presentation, laboratory results, organ involvement, treatment modalities, and outcomes.

Ethical considerations

The study was approved by the institutional ethics committee. As a retrospective chart review with anonymized data, informed consent was waived.

Results

Demographic and exposure characteristics

During the flooding period, 262 confirmed leptospirosis cases were identified, of which 27 (10.30%) developed severe disease requiring ICU admission or organ support. The six patients included in this report represent PCR-confirmed severe cases with the most complete datasets available for detailed clinical review. Six patients were identified. Median age was 41.5 years (range 19–70), and five were male. Five patients reported direct floodwater exposure, primarily walking through floodwater or cleaning homes after flooding. The incubation period ranged from 1 to 5 days. None received doxycycline prophylaxis (Table 1).

Clinical presentation

Fever and myalgia were the most frequent presenting symptoms. Two patients presented with hemoptysis, and several exhibited hypotension or shock at admission. Thrombocytopenia was common, and elevated liver enzymes and creatinine levels were frequently observed.

Organ involvement and severity

Acute kidney injury: 4⁄6

Pulmonary hemorrhage: 4⁄6

Table 1 Baseline characteristics of patients with severe leptospirosis (n=6)

Characteristic	Value
Age, median (range), years	41.5 (19–70)
Sex, n (%)	Male 5 (83.3%); Female 1 (16.7%)
Occupation, n (%)	Laborer 4 (66.7%); Unemployed 1 (16.7%); Housewife 1 (16.7%)
Underlying disease, n (%)	None 4 (66.7%); CKD 1 (16.7%); Malignancy 1 (16.7%)
History of floodwater exposure, n (%)	5 (83.3%)
Skin wound during exposure, n (%)	2 (33.3%)
Median incubation period, days (range)	4 (1–5)
Received doxycycline prophylaxis, n (%)	0 (0%)
Common presenting symptoms, n (%)	Fever 5 (83.3%); Myalgia 5 (83.3%); Hemoptysis 2 (33.3%)
Thrombocytopenia (<100,000⁄mm^3), n (%)	5 (83.3%)
PCR confirmation, n (%)	6 (100%)

PCR=polymerase chain reaction, CKD=chronic kidney disease

Liver involvement: 5⁄6

Shock requiring vasopressors: 5⁄6

Mechanical ventilation: 5⁄6

Renal replacement therapy: 2⁄6

All patients required ICU admission.

Treatment

All cases received ceftriaxone as first-line therapy; two also received doxycycline or azithromycin. Supportive management included vasopressors, mechanical ventilation, and renal replacement therapy as indicated.

Outcomes

Five patients survived and were discharged or transferred after clinical improvement. One elderly patient with multiple comorbidities died due to multiorgan failure, resulting in a case-fatality rate of 16.7%. Hospital length of stay ranged from 5 to 45 days.

Individual case summaries

Table 2 summarizes the clinical severity, management, and outcomes of all patients, and Table 3 provides a summary of each individual case.

Discussion

This case series demonstrates the severe clinical impact of leptospirosis following prolonged large-scale flooding in Southern Thailand. Pulmonary hemorrhage was observed in 66.7% of six cases, higher than previously reported cohorts (20–40%), which may reflect delayed access to care, intense floodwater exposure, and tertiary referral bias[5,7,8]. Prolonged immersion in contaminated water, high bacterial load, and skin barrier disruption likely contributed to severe disease in this cohort. Compared with sporadic cases, flood-associated leptospirosis may present with clustered onset, shorter incubation, and more frequent pulmonary complications. The prolonged flood duration and water levels of up to 4 meters across Songkhla province likely increased the risk of repeated exposure. These findings highlight the importance of the early recognition of acute undifferentiated fever after flooding, particularly in patients with thrombocytopenia, acute kidney injury, or respiratory symptoms. Early PCR confirmation enabled prompt ceftriaxone treatment and ICU support, which likely improved survival. Advanced age, comorbidities, and the lack of doxycycline prophylaxis may have contributed to poorer outcomes, emphasizing the importance of preparedness and preventive strategies in flood-prone endemic settings[5,6]. This study was limited by its retrospective design, small sample size, and potential selection bias due to incomplete medical records, which may limit generalizability. The descriptive nature of this case series precludes causal inferences; therefore, the findings should be interpreted cautiously.

Table 2 Clinical severity, management, and outcomes

Variable	n (%) or Value
Acute kidney injury	4 (66.7%)
Pulmonary hemorrhage	4 (66.7%)
Liver involvement	5 (83.3%)
Shock requiring vasopressors	5 (83.3%)
ARDS	3 (50.0%)
ICU admission	6 (100%)
Mechanical ventilation	5 (83.3%)
Renal replacement therapy	2 (33.3%)
Primary antibiotic (ceftriaxone)	6 (100%)
Combination antibiotic therapy	3 (50.0%)
Length of hospital stay, median (range), days	12 (5–45)
Length of ICU stay, median (range), days	7 (1–24)
Complications (renal failure)	1 (16.7%)
Mortality	1 (16.7%)
Recovered⁄Improved	5 (83.3%)

ARDS=ARDS=acute respiratory distress syndrome, ICU=Intensive care unit

Table 3 Summary of six leptospirosis cases. "Recovered" indicates the patient survived; "Death" indicates the patient died. All diagnoses were confirmed by PCR, and treatments consisted of the appropriate antibiotics

Case	Age (years)	Sex	Main symptoms	Hospital stay (days)	Diagnostic test(s)	Treatment	Outcome
1	55	Male	Fever, myalgia, headache, nausea/vomiting, dyspnea, hemoptysis	9	PCR (positive)	Ceftriaxone	Recovered
2	70	Male	Fever, myalgia, hemoptysis, hematochezia	45	PCR (positive)	Ceftriaxone+Azithromycin	Recovered
3	25	Male	Fever, myalgia, headache	5	PCR (positive)	Ceftriaxone+Doxycycline	Recovered
4	19	Male	Fever, myalgia, headache	15	PCR (positive)	Ceftriaxone	Recovered
5	69	Female	Dyspnea, confusion	3	PCR (blood, urine) (positive)	Ceftriaxone+Doxycycline	Death
6	28	Male	Fever, myalgia, nausea/ vomiting	9	PCR (positive)	Ceftriaxone	Recovered

PCR=polymerase chain reaction

Conclusion

Severe leptospirosis remains a life-threatening condition in post-flood settings. Prompt recognition, early antimicrobial therapy, and aggressive supportive management are essential to reduce mortality. Strengthening surveillance and preparedness in flood-prone regions is crucial.

Acknowledgement

The authors thank the medical and nursing staff of the Intensive Care Unit and the Department of Internal Medicine, Hatyai Hospital, for their dedicated patient care and support in data collection.

Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this paper.

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