

Severe chikungunya infection requiring intensive care unit admission during the 2024– 2025 outbreak on Réunion Island: a multicentre observational study

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Abstract

Background.

Chikungunya (CHIK) is an arboviral disease transmitted by *Aedes* mosquitoes. Following the 2005–2006 outbreak, Réunion Island experienced a new outbreak in 2024–2025, with more than 54,500 laboratory-confirmed cases. This study aimed to describe the clinical characteristics, severe manifestations, and outcomes of CHIK and to identify factors associated with mortality among patients requiring intensive care unit (ICU) admission for severe disease.

Methods.

This multicentre observational study was conducted in the three adult ICUs on Réunion Island. All patients aged ≥ 18 years with laboratory-confirmed CHIK infection who were admitted between 23 August 2024 and 24 June 2025 were evaluated.

Results.

Among 55,545 laboratory-confirmed cases, 554 patients required hospitalisation and 44 patients with severe CHIK required ICU admission. Median age was 69 years, and 91% of patients had at least one comorbidity. The main organ failures were renal (59%), circulatory (43%), respiratory (41%), and neurological (14%). Half of the patients received catecholamines, 32% required invasive mechanical ventilation, and 30% underwent renal replacement therapy. In-hospital mortality was 29%. Pre-existing diabetes mellitus was the only independent predictor of mortality (OR 4.92, 95% CI 1.02–23.81; $P = 0.047$).

Conclusions.

Severe CHIK can cause life-threatening multiorgan involvement, particularly in older patients with comorbidities. Hepatorenal involvement predominated, although neurological, cardiac, and haemorrhagic manifestations similar to those reported with other arboviral infections were also observed. These findings highlight the need for close monitoring of vulnerable patients, particularly those with diabetes, as well as effective preventive measures to mitigate the risk of future outbreaks.

Introduction

Chikungunya virus (CHIK) virus is an RNA arbovirus belonging to the genus *Alphavirus* within the family *Togaviridae*. It is transmitted by *Aedes* mosquitoes, with *Aedes aegypti* considered the main vector worldwide. CHIK virus can also be transmitted by *Aedes albopictus*, which is the principal vector on Réunion Island [1]. Réunion Island is a French territory in the Indian Ocean near Madagascar, with

approximately 896,000 inhabitants. The first indigenous case of CHIK on Réunion Island was reported in 2005 and was followed by a large outbreak in 2005–2006, during which an estimated 244,000 people were infected [2]. Viral adaptation to the local mosquito vector contributed substantially to this epidemic. In particular, the E1-A226V mutation increased CHIK virus infectivity in *Aedes albopictus*, thereby facilitating transmission [3]. The high proportion of the population infected and subsequently immunised during the 2005–2006 epidemic contributed to the disappearance of local CHIK cases [4].

In 2024–2025, however, Réunion Island experienced a second large-scale chikungunya outbreak, with more than 54,500 laboratory-confirmed cases and approximately 200,000 people seeking primary care for symptoms clinically suggestive of CHIK [5]. The resurgence in viral circulation began on 23 August 2024, when an autochthonous index case was identified in a patient with no travel history and no known epidemiological link to another suspected case. Réunion Island entered an epidemic phase on 13 January 2025. At the end of the outbreak, a seroprevalence study estimated that 66% of the population was immune to chikungunya [6].

Genomic analyses showed that the viruses responsible for this resurgence formed a monophyletic lineage belonging to the East-Central-South-African (ECSA) genotype [7]. Phylogenetic analyses linked the circulating strain to the ECSA-2 lineage, which is distinct from the ECSA lineage responsible for the 2005–2006 outbreak on Réunion Island [7, 8]. The 2024–2025 strain carried the E1-A226V mutation, which is thought to facilitate CHIK virus transmission by *Aedes albopictus* [3, 7], as well as the E2-L210Q and E2-I211T substitutions, which may further improve adaptation to this vector [3]. These mutations are particularly relevant on Réunion Island, where *Aedes albopictus* is the predominant CHIK virus vector [3, 9].

More than four million cases of chikungunya virus infection have been documented worldwide. Most have occurred in endemic regions, particularly South America and the Caribbean. Nevertheless, outbreaks may rapidly emerge in temperate regions, including North America and southern Europe, because *Aedes albopictus* is established in these areas and because large numbers of travellers return from regions with ongoing CHIK virus transmission [10, 11]. Few studies have described severe chikungunya requiring intensive care, either on Réunion Island or elsewhere, and available studies have generally been single-centre investigations or have focused on specific manifestations such as encephalopathy [12, 13]. Epidemiological data encompassing the full spectrum of severe disease during a second large-scale outbreak remain scarce.

The re-emergence of an ECSA-2 lineage carrying mutations that promote adaptation to *Aedes albopictus* highlights the importance of genomic and epidemiological surveillance for understanding CHIK epidemic dynamics. The aim of this study was to describe the epidemiology, clinical characteristics, severe manifestations, and outcomes of adults with chikungunya admitted to ICUs on Réunion Island during the 2024–2025 outbreak and to identify factors associated with in-hospital mortality.

Materials and methods

Study population

This retrospective multicentre study included all adults with laboratory-confirmed chikungunya infection who were admitted to one of the three adult ICUs on Réunion Island between 23 August 2024 (the date of the first identified case) and 24 June 2025 (the official end of the epidemic declared by the health authorities). The participating centres were Félix Guyon University Hospital in the north of the island, Saint-Pierre University Hospital in the south, and Centre Hospitalier Ouest Réunion in Saint-Paul in the west.

Ethics

An information letter was sent to each participant or their legal representative. Formal consent was not required because of the retrospective and observational nature of the study. The protocol was reviewed by the French Ethics Committee for Infectious and Tropical Diseases (CER-MIT, No. 2025_0703-2), and the study was declared to the French Data Protection Authority in accordance with applicable recommendations for observational studies.

Definition of severe chikungunya and eligibility criteria

Patients were eligible if they were aged ≥ 18 years, had laboratory-confirmed CHIK virus infection, and required ICU admission in the clinical context of chikungunya. Laboratory confirmation required at least one of the following: detection of CHIK virus RNA by reverse-transcription polymerase chain reaction (RT-PCR) in blood, or evidence of a humoral immune response defined by seroconversion or a fourfold increase in total antibody titres. Patients were also required to have at least two compatible clinical symptoms within the 12 days preceding ICU admission, including fever ($>38^{\circ}\text{C}$), headache, skin rash, myalgia, arthralgia, psychomotor slowing, nausea, vomiting, abdominal pain, or jaundice [14]. Patients younger than 18 years were excluded.

Study endpoints

The primary endpoint was in-hospital mortality. Data were collected from routine documentation in the patient data management systems (Crossway®, DxCare®, Cegedim Santé, Paris, France). Variables included demographic characteristics (age, sex, and comorbidities), clinical presentation at ICU admission (vital signs and organ failures), laboratory findings, organ-support requirements, lengths of stay, and in-hospital mortality. Secondary endpoints were the identification of factors associated with mortality, description of the different clinical phenotypes of severe chikungunya, and estimation of the incidence of severe cases. This observational study was reported in accordance with the STROBE guidelines.

Statistical analysis

Continuous variables are reported as median [25th–75th percentiles] and categorical variables as number (percentage). Continuous variables were compared using the Mann–Whitney U test or unpaired

Student's t test, as appropriate. Categorical variables were compared using the chi-square test or Fisher's exact test. Clinical variables associated with mortality at $P < 0.05$ in univariable analyses were considered for inclusion in a multivariable logistic regression model with backward selection. Collinearity among candidate variables was assessed, and clinically relevant variables were retained for multivariable analysis. A two-sided P value < 0.05 was considered statistically significant. Analyses were performed using SAS statistical software (version 8.2; Cary, NC, USA).

Results

Study population and baseline characteristics

During the study period, 55,545 laboratory-confirmed CHIK cases were reported on Réunion Island, including 554 hospitalisations lasting > 24 h. Forty-eight patients with possible severe CHIK infection requiring ICU admission were initially identified. Four were excluded: one patient was younger than 18 years, and three were admitted to the ICU for conditions unrelated to CHIK (polytrauma, intracranial hypertension caused by a meningeal lymphoma, and severe burns), with CHIK diagnosed during hospitalisation (Fig. 1). The final cohort therefore included 44 patients. This corresponded to 0.8 ICU admissions for severe CHIK per 1,000 laboratory-confirmed infections and to 8.1% of hospitalised patients requiring ICU care.

Baseline characteristics and initial symptoms are shown in Table 1. Median age was 69 [58–77] years, and 22 patients (50%) were male. Forty patients (91%) had at least one pre-existing condition, most commonly hypertension (32 patients, 73%) and diabetes mellitus (18 patients, 41%). The most frequent symptoms before hospitalisation were fever > 38 °C (27 patients, 61%), arthralgia (22, 50%), and abdominal pain (18, 41%). CHIK virus infection was confirmed by positive RT-PCR in 36 patients and by positive serology in 14 patients. The median interval between symptom onset and diagnosis was 3 [2–6] days among patients with a positive RT-PCR result and 8 [7–9] days among those with positive serology.

Table 1- Baseline characteristics of the study population

Characteristics	Alive at day 28	Dead at day 28	Total	P value
	(n = 31)	(n = 13)	(n = 44)	
Male sex	15 (48)	7 (54)	22 (50)	0.74
Age (years)	66 [55–74]	76 [68–82]	69 [58–77]	0.054
Body mass index (kg/m ²)	28 [24–39]	24 [23–25]	27 [23–33]	0.12
Pre-existing medical conditions				
Hypertension	21 (68)	11 (85)	32 (73)	0.46
Diabetes mellitus	9 (29)	9 (69)	18 (41)	0.013
Current or former smoking	9 (29)	3 (23)	12 (27)	1
Hazardous alcohol use	5 (16)	2 (15)	7 (16)	1
History of congestive heart failure	1 (3.2)	4 (31)	5 (11)	0.022
Liver cirrhosis	1 (3.2)	1 (7.7)	2 (4.5)	0.51
COPD	4 (13)	1 (7.7)	5 (11)	1
Pre-existing neurological disease	5 (16)	3 (23)	8 (18)	0.68
Cancer diagnosed <4 months previously	1 (3.2)	0 (0)	1 (2.3)	1
Immunosuppressive treatment	3 (9.7)	1 (7.7)	4 (9.1)	1
Chronic kidney disease	5 (16)	3 (23)	8 (18)	0.68
Initial symptoms of CHIK				
Fever >38 °C	19 (61)	8 (62)	27 (61)	0.99
Skin rash	10 (32)	4 (31)	14 (32)	1
Arthralgia	15 (48)	7 (54)	22 (50)	0.74
Myalgia	11 (35)	5 (38)	16 (36)	1
Headache	4 (13)	1 (7.7)	5 (11)	1
Confusion	8 (26)	4 (31)	12 (27)	0.73
Psychomotor retardation	10 (32)	4 (31)	14 (32)	1
Nausea/vomiting	13 (42)	2 (15)	15 (34)	0.16

Abdominal pain	16 (52)	2 (15)	18 (41)	0.026
Hepatomegaly	1 (3.2)	1 (7.7)	2 (4.5)	0.51
Jaundice	0	1 (7.7)	1 (2.3)	0.3

Values are presented as n (%) or median [25th–75th percentiles], as appropriate.

COPD, chronic obstructive pulmonary disease.

Clinical presentation at ICU admission

Nineteen patients (43%) presented with circulatory failure, including vasoplegic shock in 16 (36%), cardiogenic shock in 4 (9.1%), and haemorrhagic shock related to gastrointestinal bleeding in 1 (2.3%). Eighteen patients (41%) had respiratory failure, and 26 (59%) had acute kidney injury. Six patients (14%) presented with neurological manifestations attributed to CHIK, including meningoencephalitis and Guillain–Barré syndrome; CHIK virus RT-PCR in cerebrospinal fluid (CSF) was positive in three of these patients. One additional patient had a positive CSF RT-PCR result but neurological symptoms considered secondary to cardiogenic shock at admission. Other neurological presentations included status epilepticus, coma, and severe symptomatic hyponatraemia (110 mmol/L).

Two patients were admitted with obstetric complications: postpartum HELLP syndrome and severe pre-eclampsia with neurological manifestations requiring emergency caesarean delivery for maternal rescue. Other severe presentations included acute hepatitis and severe immune thrombocytopenia with a platelet count of 4 G/L.

Fifteen patients were admitted with an initial diagnosis other than CHIK, which was diagnosed later during hospitalisation. Nineteen patients (43%) were admitted because of exacerbation of a pre-existing chronic condition. Documented bacterial co-infection was present in 27% of cases, including one case of leptospirosis, and 66% of patients received antibiotics at ICU admission. Physiological and laboratory variables are presented in Tables 2 and 3. Aminotransferase concentrations >3 times the upper limit of normal were observed in 28 patients (64%), with aspartate aminotransferase predominating in most cases. Lymphopenia (<1 G/L) and thrombocytopenia (<150 G/L) were present at admission in 31 (70%) and 20 (45%) patients, respectively. Thirteen patients (29%) had rhabdomyolysis, defined by a creatine phosphokinase concentration >1,000 IU/L.

Table 2- Physiological characteristics at intensive care unit admission

Characteristics	Alive at day 28	Dead at day 28	Total	P value
	(n = 31)	(n = 13)	(n = 44)	
Neurological disorders	12 (39)	6 (46)	18 (41)	0.65
Confusion	13 (42)	7 (54)	20 (45)	0.47
Meningeal syndrome	0 (0)	1 (7.7)	1 (2.3)	0.3
Dyspnoea	15 (48)	10 (77)	25 (57)	0.081
Glasgow Coma Scale score	15 [14–15]	10 [6–14]	14 [11–15]	<0.01
Mean arterial pressure (mmHg)	76 [66–91]	76 [59–85]	76 [64–87]	0.4
Heart rate (/min)	85 [75–99]	87 [67–115]	86 [70–104]	0.45
Respiratory rate (/min)	25 [20–30]	24 [22–35]	25 [20–30]	0.79
Oxygen saturation (%)	96 [91–98]	96 [91–97]	96 [91–98]	0.94
Temperature (°C)	36.8 [36.5–38.2]	36.5 [36.3–37.1]	36.8 [36.4–37.6]	0.1
SOFA score	4 [2.5–5]	12 [7–13]	5 [3–10]	<0.001

Values are presented as n (%) or median [25th–75th percentiles], as appropriate.

SOFA, Sequential Organ Failure Assessment.

Table 3- Laboratory characteristics at intensive care unit admission

Characteristics	Alive at day 28	Dead at day 28	Total	P value
	(n = 31)	(n = 13)	(n = 44)	
pH	7.36 [7.29–7.43]	7.39 [7.27–7.48]	7.36 [7.27–7.45]	0.93
PaO ₂ (mmHg)	86 [73–110]	84 [62–101]	84 [71–106]	0.6
PaCO ₂ (mmHg)	31 [26–43]	37 [35–43.0]	35 [28–43]	0.27
Bicarbonate (mmol/L)	18 [13–22]	20 [14–22]	18 [14–22]	0.61
PaO ₂ /FiO ₂ ratio	170 [135–200]	130 [86–240]	160 [91–211]	0.54
Lactate (mmol/L)	2 [1.2–3.2]	3.3 [1.5–5.6]	2 [1.2–3.8]	0.24
Leukocyte count (G/L)	7.5 [6.4–13]	11.1 [8.6–13.1]	9.1 [6.6–13.1]	0.16
Neutrophil count (G/L)	6.6 [5.2–10.6]	9.5 [6.8–11.2]	7 [5.7–11.1]	0.12
Eosinophil count (G/L)	0 [0–0]	0 [0–0]	0 [0–0]	0.77
Lymphocyte count (G/L)	0.7 [0.5–0.9]	0.6 [0.4–1.2]	0.7 [0.4–1.1]	1
Haemoglobin (g/dL)	11.6 [10.0–13.1]	11.4 [9.80–13.7]	11.4 [9.88–13.1]	0.88
Platelet count (G/L)	166 [107–222]	141 [88.0–234]	161 [100–230]	0.69
Prothrombin time (%)	79.0 [55.2–93.8]	86.0 [53.0–100]	84.0 [55.0–94.5]	0.74
Fibrinogen (g/L)	3.47 [2.76–5.60]	3.27 [2.75–4.36]	3.38 [2.75–4.96]	0.54
Creatinine (μmol/L)	96 [69–220]	224 [152–282]	154 [80–248]	0.1
Serum potassium (mmol/L)	4 [3.6–4.3]	4.3 [3.6–4.6]	4 [3.6–4.4]	0.47
Serum sodium (mmol/L)	136 [133–139]	138 [136–143]	137 [134–139]	0.063
C-reactive protein (mg/L)	60 [20–121]	55 [12–183]	60 [16–135]	1
Procalcitonin (ng/L)	4.7 [0.4–13]	10.4 [6.8–20.4]	6.3 [0.7–16.1]	0.33

Alanine aminotransferase (IU/L)	50 [20–102]	181 [58–539]	73 [21–139]	0.034
Aspartate aminotransferase (IU/L)	110 [37–250]	298 [178–984]	169 [41–298]	0.017
γ-Glutamyl transferase (IU/L)	53 [25–81]	38 [28–169]	50 [26–94]	0.78
Alkaline phosphatase (IU/L)	90 [69–115]	99 [69–132]	90 [69–120]	0.82
Total bilirubin (μmol/L)	13 [9–23.0]	14 [9–30]	13 [9–24]	0.46
Conjugated bilirubin (μmol/L)	8 [5–18]	11 [7–47]	10 [6–20]	0.27
Pancreatic lipase (IU/L)	25 [12–71]	63 [57–116]	33 [15–92]	0.071
Creatine phosphokinase (mg/L)	366 [99–1593]	381 [102–1120]	381 [97–1606]	0.65
Troponin (ng/L)	77 [28–412]	136 [65–946]	102 [39–544]	0.28
Ferritin (ng/mL)	676 [228–1129]	2954 [2561–3968]	910 [511–2954]	<0.01
Glycated haemoglobin (%)	6.18 [5.56–6.6]	6.66 [6.48–6.84]	6.28 [5.91–6.84]	0.43

Values are presented as median [25th–75th percentiles].

FiO₂, fraction of inspired oxygen; PaO₂, arterial partial pressure of oxygen; PaCO₂, arterial partial pressure of carbon dioxide.

Outcomes

Twenty-two patients (50%) received catecholamines, 14 (32%) required invasive mechanical ventilation, and 13 (30%) underwent renal replacement therapy. Three patients (7%) had bleeding or haemorrhagic manifestations. Three patients (7%) received blood products: two received red blood cell concentrates and one received platelet concentrates in the context of thrombotic microangiopathy. Median ICU length of stay was 4 [3–6] days. In-hospital mortality was 29% (13/44).

Among the 13 patients who died, six died from multiple organ failure. The predominant underlying mechanism was cardiovascular failure in four patients, including one with concomitant septic shock. One patient died from isolated septic shock and one from acute-on-chronic liver failure. Overall, septic shock was present in three fatal cases, including one associated with cardiovascular failure and one complicated by mesenteric ischaemia. Five patients died after severe neurological injury following a decision to withdraw life-sustaining treatment. One additional patient died from cardiorenal syndrome after a decision to withhold escalation of care, including invasive mechanical ventilation. Overall, a decision to withhold or withdraw life-sustaining treatment was made for nine of the 13 patients who died.

Factors associated with in-hospital mortality

In univariable analyses, pre-existing diabetes mellitus, chronic heart failure, the need for ventilatory support (invasive or non-invasive), and respiratory failure at admission were associated with in-hospital mortality. Higher Sequential Organ Failure Assessment (SOFA) scores, higher aspartate and alanine aminotransferase concentrations, and lower Glasgow Coma Scale scores at admission were also associated with mortality. Abdominal pain before admission was more frequent among survivors and was therefore considered a potential protective marker. Only abdominal pain before admission, pre-existing diabetes mellitus, and chronic heart failure were entered into the multivariable logistic regression model as clinical variables.

In multivariable analysis, pre-existing diabetes mellitus was the only factor independently associated with in-hospital mortality (OR 4.92, 95% CI 1.02–23.81; $P=0.047$). Pre-existing chronic heart failure showed a non-significant association ($P=0.092$; OR 8.98 [as reported in the source table/model]), whereas abdominal pain before hospitalisation was not significantly associated with mortality ($P=0.201$; OR 3.25, 95% CI 0.53–19.79).

Discussion

This multicentre retrospective study describes the clinical spectrum, outcomes, and factors associated with mortality among adults admitted to ICUs for severe CHIK during the 2024–2025 outbreak on Réunion Island. The predominant phenotype combined hepatic and renal involvement, frequently accompanied by lymphopenia and, in almost half of patients, haemodynamic failure. Other severe presentations included neurological disease, such as meningoencephalitis and acute polyradiculoneuropathy, thrombocytopenia, and rhabdomyolysis. Pre-existing diabetes mellitus was the only independent predictor of in-hospital mortality, and deaths were mainly related to multiple organ failure.

Importantly, 43% of patients were admitted to the ICU because of exacerbation of a pre-existing chronic disease, and 27% had documented co-infections, most commonly pneumonia or urinary tract infection. Most patients received antibiotics at ICU admission. These proportions were higher than those reported by Lemant et al., in whose cohort 18% of ICU admissions were related to exacerbation of pre-existing disease and 24% to co-infection involving the respiratory or urinary tract [12]. However, 91% of patients in our cohort had at least one pre-existing condition, whereas 27% of patients in the previous study had no relevant medical history [12]. Crosby et al. similarly reported that 41.5% of patients admitted to the ICU for severe CHIK during the 2013–2014 Caribbean outbreak experienced exacerbation of a comorbidity [15]. Few studies have specifically addressed bacterial co-infection. Some authors have suggested that CHIK virus infection itself may induce a sepsis-like syndrome in the absence of documented bacterial infection. In the study by Rollé et al., 25 patients presented with severe sepsis or septic shock despite the absence of identified bacterial co-infection [16].

The clinical spectrum of severe CHIK was broad. Before ICU admission, fever and arthralgia were the most frequently reported symptoms, consistent with the classic presentation of chikungunya. None of the patients reported a known history of chikungunya during the initial assessment. Previous infection may nevertheless have been under-recognised, because seroprevalence studies suggest that approximately 40% of the population of Réunion Island had been exposed during the 2005–2006 outbreak [4]. Abdominal pain is a recognised extra-articular manifestation of CHIK, reported in 19–48% of cases, and occurred in 41% of our patients [17, 18]. In our cohort, abdominal pain was more frequent among survivors than non-survivors. This contrasts with data from Brazil reported by de Moraes Alves Barbosa Oliveira et al., in which abdominal pain was more frequently associated with severe disease [19].

Renal and respiratory dysfunction were among the most frequent organ failures at ICU admission. Acute kidney injury was probably multifactorial, involving systemic hypoperfusion, rhabdomyolysis, and potentially immune-mediated mechanisms. Respiratory failure was associated with mortality in univariable analysis and was mainly attributable to cardiogenic or fluid-overload pulmonary oedema, infectious pneumonia, or septic shock, including acute respiratory distress syndrome or compensatory hyperventilation. These findings are consistent with those of de Moraes Alves Barbosa Oliveira et al., who reported dyspnoea in 31% of patients and a strong association with death; however, that study used a case-control design and the estimate was imprecise [19]. Gupta et al. identified respiratory and acute renal failure as common severe manifestations after cardiovascular failure and reported renal replacement therapy as an independent predictor of mortality [20].

The median SOFA score at ICU admission was 5 [3–10] and was significantly higher among non-survivors than survivors ($P < 0.001$). SOFA is not specific to CHIK infection but is a general prognostic tool reflecting the extent of organ dysfunction. Diabetes mellitus was the only independent predictor of mortality in our multivariable model. Previous studies, including a meta-analysis by Badawi et al. and a study by Micheloto et al., have also identified diabetes as a risk factor for mortality in CHIK infection and have reported greater morbidity, longer symptom duration, and increased symptom severity among patients with diabetes [22, 23]. CHIK infection may also destabilise glycaemic control, requiring intensification or adjustment of antidiabetic treatment in a substantial proportion of patients [24, 25]. In our cohort, ICU admission was directly related to diabetes or its treatment in four cases (9%), including two cases of diabetic ketoacidosis and two cases of metformin-associated toxicity.

In-hospital mortality among ICU patients was 29%, lower than that reported during the 2005 outbreak on Réunion Island [12, 26]. The apparent lower case-fatality rate during the 2024–2025 epidemic may reflect several non-mutually exclusive factors, including differences between viral strains, improvements in medical care, earlier identification of patients at risk, and strengthened preventive measures. This comparison should nevertheless be interpreted cautiously because differences in case ascertainment, admission practices, population characteristics, and study design may also contribute. Moreover, analyses of overall mortality identified excess deaths, particularly among older people, during the months corresponding to the epidemic peak [27].

A major challenge in CHIK infection remains the absence of specific antiviral treatment and the limited range of preventive measures beyond vector control and personal protection. The 2024–2025 outbreak also raised important questions regarding vaccination strategies in vulnerable populations [28]. More broadly, the scale of the Indian Ocean outbreak illustrates the potential for chikungunya to emerge in regions where competent *Aedes* vectors are established and population immunity is low. Mutations in the CHIK virus genome can enhance transmission by influencing viral fitness in mosquito vectors such as *Aedes albopictus* and *Aedes aegypti*, potentially facilitating larger outbreaks and geographic expansion [3, 29].

The re-emergence of chikungunya on Réunion Island occurred in a specific epidemiological and genomic context. Phylogenetic analyses showed that the viruses responsible for the second epidemic belonged to a single monophyletic clade within the ECSA-2 lineage, distinct from the ECSA-IOL strain that circulated during the 2005–2006 epidemic [7]. The same lineage has been identified in imported or locally acquired cases in Mayotte, in travellers or cases linked to Réunion in mainland France, elsewhere in the Indian Ocean region, and beyond, demonstrating its capacity for regional and international spread [30]. In metropolitan France, 3,671 imported chikungunya cases were reported between 2006 and 2025, including 620 in 2025; most viraemic cases in 2025 occurred in departments colonised by competent vectors [11].

This study has several limitations. Its retrospective multicentre design resulted in incomplete data collection and non-standardised management across participating ICUs. Missing data particularly concerned patients' immunological status regarding previous CHIK infection and viral genotype. In addition, the study population did not include pregnant women, apart from two women in the postpartum period, or neonates. CHIK virus infection is known to cause severe neonatal disease, including multiple organ failure, disseminated intravascular coagulation, and meningoencephalitis. During the present outbreak, 22 severe neonatal cases, including two deaths, were reported [5, 31]. The resurgence of CHIK on Réunion Island should also be interpreted in light of residual population immunity from the 2005–2006 epidemic, when approximately 38% of the population was estimated to have been infected [2, 27]. Despite this residual immunity, almost two decades without sustained local transmission likely allowed a sufficiently large susceptible population to accumulate, enabling another large-scale outbreak.

Conclusions

Severe chikungunya requiring intensive care was uncommon but potentially fatal during the 2024–2025 outbreak on Réunion Island. The infection produced a broad multisystem phenotype, including hepatic, renal, cardiovascular, respiratory, and neurological complications. Despite intensive organ support, in-hospital mortality was 29%, and pre-existing diabetes mellitus was the only independent predictor of mortality in the multivariable analysis.

These findings emphasise the need for early recognition of severe chikungunya, particularly in older patients with comorbidities, and for prompt supportive and intensive care when indicated. In the

absence of effective specific antiviral treatment, prevention, surveillance, and early detection remain central to reducing the burden of chikungunya. The emergence of CHIK in new geographical areas where competent Aedes vectors are established also highlights the need to improve clinicians' awareness of its potentially severe manifestations.

Abbreviations

ARDS: acute respiratory distress syndrome

CHIK: Chikungunya

CSF: Cerebrospinal Fluid

ICU: Intensive Care Unit

PCR: polymerase chain reaction

RT: Reverse transcription

SOFA: Sequential Organ Failure Assessment

Declarations

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Author contributions

Nicolas Allou, Maïalen Doyon : Writing original draft, Methodology, Supervision, Investigation, Conceptualization, Validation, Visualization. Yohan cerveaux, Romane Crouzet, Nicolas Traversier, Marie-Christine Jaffar-Bandjee: Investigation, Data curation. Charles Vidal, Jérôme Allyn and Arnaud Desvergez: Investigation. Romane Crouzet: Data curation.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Formal consent was not required due to the retrospective and observational nature of the study. In accordance with current French law, informed written consent for demographic, physiologic and hospital outcome data analyses was not obtained because this observational study did not modify existing diagnostic or therapeutic strategies. Nonetheless, patients and/or relatives were informed about the anonymous data collection and told that they could decline inclusion. The protocol was reviewed by the French Ethics Committee for Infectious and Tropical Diseases (CER-MIT, N°2025_0703-2), and the study was declared to the French Data Protection Authority in accordance with international recommendations for observational studies

Consent for publication

A newsletter was sent to each participant or their legal representative in accordance with the French Data Protection Act of January 6, 1978

Competing interests

The authors declare no competing interests

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Figures

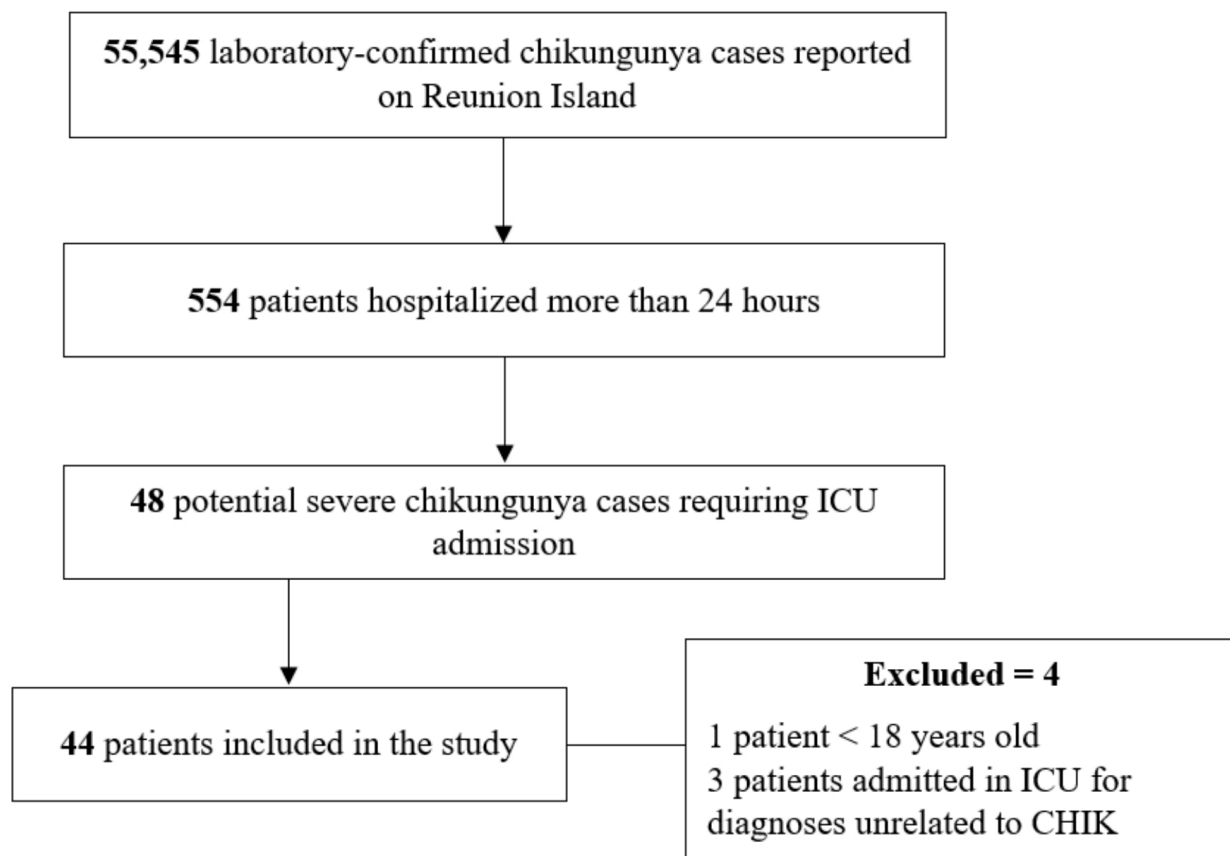


Figure 1

Flow diagram of the study population