

# Tropical Infections in the Indian Intensive Care Units: The Tip of the Iceberg!

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Singular infections that occur principally in the tropical areas of the world are called tropical infections, which include a variety of parasitic, viral, bacterial, and fungal infections. These, however, are now of concern not only in the tropical regions, but the other areas of the world may also see an increased incidence of these infections due to increased international travel. Tropical infections present with many common features, such as fever, rash, hypotension, thrombocytopenia, and mild derangement of liver function tests making the initial diagnosis difficult. This difficulty may be further exacerbated by a lack of resources for diagnostic equipment or test kits and many of these tests being negative in the early phases of illness. Karnad et al. suggested adopting a syndromic approach to narrow down the list of possible diagnoses so that empiric therapy can be started at the earliest.<sup>1</sup> They suggested that adopting a systematic approach by looking at the pattern of organ involvement and subtle differences in manifestations and obtaining a history of travel and exposure to specific environments, such as forests or farms, water sports, may help in differential diagnosis and choice of initial empiric therapy.

Many of these infections, such as dengue, malaria, scrub typhus, Japanese encephalitis, and others are endemic in India. The INDICAPS I study found that the overall incidence of tropical infections in the Indian intensive care unit (ICU) was 5.7% (231 of 4038) and the mortality owing to tropical infections was 6.9% (50 of 729).<sup>2</sup>

Singhi et al. conducted an observational study of patients with tropical infections needing ICU admission in Indian ICUs over 3 months.<sup>3</sup> There was clear evidence of a seasonal trend with most infections occurring immediately after the monsoon, all across India. They found that dengue (23%) was the most common tropical infection followed by scrub typhus (18%), encephalitis/meningitis (9.6%), malaria (8%). The common presentation of tropical illness and the reasons why this group of patients needs ICU admission are summarized in Table 1.<sup>4</sup> In their cohort, 18.4% of patients died and 4.4% of patients had some disability at discharge. An important finding of the study was that mortality was higher in patients with unclear etiology. Need for invasive mechanical ventilation (odds ratio [OR] = 8.3 [3.4–20]), presence of multi-organ failure at admission ([OR] = 2.8 [1.8–6.6]), sequential organ failure assessment (SOFA) score on day 1 (OR = 1.2 [1.0–1.3]) were independent predictors of mortality. The spectrum of tropical infections in children was similar to that in adults in this study, but encephalopathy as a presenting manifestation was more common in children.

There is considerable regional variation in the prevalence of the various tropical disease. Prevalence of scrub typhus is more common in centers catering to a rural or semi-urban population, places with less rainfall may not have cases of leptospirosis while regions with annual monsoon floods usually have a marked seasonal spike in cases of leptospirosis 10–14 days after a flood.

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There is also a long-term change that is taking place in the pattern of tropical infections like malaria. Krishnan and Karnad described 301 patients with severe malaria admitted to the ICU of a larger public hospital in Mumbai between 1999 and 2002.<sup>5</sup> At this time, almost all patients had *Plasmodium falciparum* infection, with up to 10% had mixed infections with *P. falciparum* and *Plasmodium vivax*. Vivax malaria as a cause of organ dysfunction was rare at this time. Since then, the proportion of *P. vivax* infection presenting as severe malaria has gradually increased. A decade later, Nadkar et al. studied 711 patients with severe malaria admitted to the same ICU between 2010 and 2011 and found that 69% were due to vivax malaria and only 31% were due to *P. falciparum* infection.<sup>6</sup> The mortality in severe vivax malaria was 9.01% vs 16.1% in falciparum malaria. Since then, the proportion of *P. vivax* infection as a proportion of all severe malaria has increased even more.

It is essential for all practitioners of critical care in India to be familiar with the presentation, diagnosis, and management of these illnesses, which unless treated early and appropriately can lead to substantial morbidity and mortality. In this issue of *Advanced Frontiers of Critical Care*, a supplement of the *Indian Journal of Critical Care Medicine*, we present the approach to management, laboratory diagnosis, and management of common tropical diseases seen in India and around the world.

Although tropical diseases are considered a public health issue, a significant number of patients with these disorders require intensive care. Unfortunately, we do not have an exact idea of the number of cases that need ICU care annually in India, due to

**Table 1:** Tropical infections and reasons for ICU admission




<i>Tropical infection</i>	<i>Common reasons for ICU admission</i>
Dengue fever	Shock Fluid accumulation with respiratory distress Severe bleeding Impaired consciousness Liver failure
Scrub typhus	Myocarditis Impaired consciousness ARDS Myocarditis Renal dysfunction DIC
Malaria	Severe anemia Hypoglycemia Renal impairment Respiratory distress Severe bleeding Shock Impaired consciousness Seizures
Leptospirosis	Pulmonary hemorrhage ARDS Myocarditis Renal impairment Hepatic failure
Melioidosis	Pneumonia Septic shock
Tetanus	Severe muscle spasms Respiratory muscle spasm (leading to asphyxia) Laryngeal muscle spasm (airway obstruction) Autonomic dysfunction Seizures
Tuberculosis	ARDS Adrenal dysfunction Meningitis
Enteric fever	Intestinal perforation Impaired sensorium Traveler's diarrhea Hypovolemia Severe bleeding Impaired sensorium Respiratory distress
Leishmaniasis	Severe anemia Bleeding manifestations Secondary bacterial infections
Schistosomiasis	Esophageal varices (as a result of portal hypertension) Granulomatous inflammation in the bladder causing obstructive uropathy and renal failure Neuroschistosomiasis (spinal cord or cerebral lesions)
African trypanosomiasis	Impaired sensorium
American trypanosomiasis	Seizures Myocarditis Cardiomyopathy

ARDS, acute respiratory distress syndrome; DIC, disseminated intravascular coagulation; ICU, intensive care unit



the lack of a central database, though we do have isolated data from various areas of the country. Very often patients with tropical infections may be mislabeled or misdiagnosed because of a lack of awareness of a systematic approach towards the diagnosis and management of cases. We strongly feel the leadership Indian Society of Critical Care Medicine should take a lead in starting a registry of tropical illnesses seen in our country so that we come to know the extent of these eminently treatable diseases and improve the outcomes.<sup>7-9</sup>

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