

# Bed bug (*Cimex* spp.) colonization of human host



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## INTRODUCTION

The *Cimex* subspecies, colloquially known as bed bugs, include *Cimex lectularius* (the common bed bug) and *Cimex hemipterus* (the tropical bed bug). These nest-dwelling arthropods notoriously colonize mattress seams, cracks in bed frames, and wall crevices of homes and hotels.<sup>1,2</sup> In contrast to the human louse and scabies mite, which spend nearly their entire life cycle on human skin, bed bugs do not typically colonize humans.<sup>3</sup>

Herein, we present a unique case of a male patient acting as a human host for a colony of bed bugs. Although the patient served as a harborage site, he did not exhibit any visible arthropod bites. We also outline an intervention used to eradicate the infestation.

## CASE REPORT

A 71-year-old man with a past medical history of diabetic peripheral neuropathy and tinea pedis presented initially to the hospital for delirium. He was admitted with a collapsed left lung and methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia. During his prolonged hospital stay, he developed acute encephalopathy and respiratory failure requiring intubation, found to be secondary to pneumonia caused by *Proteus mirabilis*.

A nurse noted live insects on the patient's leg and a colony of insects under the right great toenail. The patient denied any pain and was not aware of any infestation.

On physical examination, all of the toenails demonstrated hyperkeratosis with significant dirt surrounding the nails. Adult arthropods consistent with *Cimex* spp. were observed crawling on the

### Abbreviation used:

MRSA: methicillin-resistant *Staphylococcus aureus*

patient's leg and on top of the nail of the patient's right great toe (Fig 1). Further inspection of the right great toe revealed a subungual colony of eggs, nymphs, exuviae, and adult *Cimex* spp. (Fig 2). Notably, a full skin examination revealed no other areas of colonization or any cutaneous lesions indicative of arthropod bites.

For treatment, visible arthropods were manually removed. Initially, topical permethrin 1% cream was applied locally to the toenail and subungual area, and later applied from the neck to the toes. Despite the permethrin treatment, there was a continued presence of eggs and nymphs under the nail of the right great toe. Subsequently, the entire subungual area was debrided and cleaned with isopropyl alcohol and chlorhexidine, followed by daily topical permethrin 5% cream to the region (Fig 3). He received oral ivermectin 200 mg once daily for 2 days. After these measures, there was no recurrence of infestation. The patient was treated for his pneumonia, and after his medical problems stabilized, he was discharged home with home health services. He has not had any further known infestations.

## DISCUSSION

We present a unique case of a human acting as a host to a colony of bed bugs. Interestingly, the patient harbored the insects, yet did not exhibit any

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**Fig 1.** *Cimex* spp. adults recovered from the nail of the right great toe.



**Fig 2.** *Cimex* spp. infestation of the subungual region of the right great toe.

visible arthropod bites. The classic appearance of bed bug bites would be 2-5-mm pruritic, erythematous papules or vesicles with a central punctum on exposed skin areas.<sup>1,2</sup> However, clinical presentation is highly variable, and some people will have no reaction at all to bites. Older adults may be less likely to have a reaction than younger adults.<sup>4</sup> Our patient may have had no reaction to bites or desensitization from repeated bites, which might explain his lack of cutaneous lesions. His peripheral neuropathy may have prevented him from detecting the insects or feeling any pain or pruritus. His acute encephalopathy may have contributed to his lack of awareness of the infestation and inability to explain the findings.

In our patient, the source of his MRSA bacteremia could not be determined. An infectious disease team was consulted and suspected the skin or lungs as potential sources. Notably, necrotic tissue and a compromised skin barrier were present under the



**Fig 3.** *Cimex* spp. colony eradication following manual debridement and treatment with isopropyl alcohol of the right great toe.

right great toenail, providing a potential source of his MRSA bacteremia. While colonization of *Cimex lectularius* with MRSA has been described, transmission of MRSA by bed bugs has not been demonstrated.<sup>5</sup> A pulmonary source was also suspected. However, 2 bronchoscopies demonstrated negative cultures, and a transesophageal echocardiogram was negative.

We describe a treatment for bed bug colonization of human tissue. Manual debridement of the colony and treatment with isopropyl alcohol were the primary components of the intervention. The clinical implications of adding topical permethrin and oral ivermectin versus debridement alone are unclear. However, as pyrethroids are a main component of insecticides used to combat *Cimex* spp., permethrin can be deemed a reasonable, well-tolerated treatment for bed bug infestation in an inpatient setting or when barriers to followup exist.<sup>2</sup> Ivermectin leads to paralysis and death of arthropods by interfering with neurotransmission. Ivermectin treatment has been described in the treatment of pediculosis capitis (head lice).<sup>6</sup> In our patient, the benefit of ivermectin is unclear, and debridement with isopropyl alcohol was likely most effective.

Traditionally, bed bugs do not spend prolonged periods on their human hosts and retreat to external harborage sites. However, case reports have observed adult bed bugs spending extended periods of time crawling directly on the skin of their human

targets and completing life cycles within human clothing.<sup>3,7,8</sup> Another case of bed bugs directly colonizing human tissue was reported in a 74-year-old male patient with venous leg ulcers, who exhibited *Carex lenticularis* nymphs and exuviae within the hyperkeratosis of his right big toe. Chemical nail avulsion successfully eradicated the colony. One month later, the patient's toes remained clear, but bed bugs were found on the patient's clothing, likely indicating reinfection from a heavily infested home. The authors did not indicate whether the patient exhibited cutaneous lesions or received any topical or oral medications.<sup>9</sup>

In our patient, the bed bug infestation was an incidental finding, with regard to his primary reason for hospitalization. Since a lack of sensation alone should not lead to bed bug colonization of human tissue, this finding in a patient lacking independence in activities of daily living raised the concern for potential elder neglect.<sup>10</sup>

Our case describes an unusual finding of bed bug colonization of human tissue. These photophobic arthropods prefer nesting in the dark cracks of the external environment, so it is unclear what prompts human colonization. However, this occurrence likely indicates a mass home infestation and should prompt investigation for neglect.

**Conflicts of interest**

None disclosed.

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