

SHORT REPORT

BED BUG (*Cimex lectularius*) INFESTATION IN A SURGERY WARD FROM NORTHEASTERN BRAZIL

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ABSTRACT

Bed bugs are arthropods of public health significance that have experienced a global resurgence. In this context, we are reporting a bed bug infestation in a surgical ward in Brazil. Thirteen patients in the surgical ward were identified as having diffuse erythematous maculopapular lesions of unknown origin. Similar signs and symptoms were observed among healthcare professionals in the same unit. The issue was addressed with all relevant departments, and a multifaceted approach was adopted to manage the infestation. Bed bugs may potentially pose health risks to both patients and healthcare professionals. It is imperative to actively monitor the structural integrity of the hospital's physical facilities to prevent arthropod infestations.

KEY WORDS: Bed bugs; *Cimex lectularius*; ectoparasitic infestations; hospitals.

Bed bugs are arthropods of the order Hemiptera, belong to the family Cimicidae. Six recognized subfamilies, 24 genera, and 110 species are known, of which three (*Cimex lectularius*, *C. hemipterus* and *Leptocimex boueti*) are of public health importance because they are domiciled, anthropophilic, and

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hematophagous, commonly affecting humans (Sheele et al., 2017; Akhoundi et al., 2020). Intriguingly, bed bugs have undergone a significant resurgence worldwide since the 1990s (Akhoundi et al., 2020). Currently, bed bugs are the most important human ectoparasites in the United States (High, 2017; Sheele et al., 2017; Sheele et al., 2021a; Sheele et al., 2021b). Infestations are usually more common in developing countries, with poor hygiene and housing conditions. They are not, however, restricted to these areas and may also occur in places frequented by travelers, such as hotels, in addition to shelters, student houses, and residences (Criado et al., 2011; High, 2017; Akhoundi et al., 2020).

The exacerbating factor in infestations lies in their global scale, which shows no signs of reversing. The phenomenon of bed bug resurgence is widely recognized and under investigation, although not fully comprehended (Criado et al., 2011; High, 2017; Sheele et al., 2017). The reasons behind the resurgence of this pest and the high rates of infestation appear to be primarily linked to the rise in international tourism and resistance to various insecticides. Interestingly, hospitals have also encountered cases of bed bug infestation worldwide (Sheele et al., 2017). Over the past decade, instances of bed bug infestations have been extensively documented in recent medical literature in many developing countries (Criado et al., 2011; Bandyopadhyay et al., 2015; Sheele et al., 2017; Sheele, 2021). Consequently, bed bug infestations in low-income countries remain vastly under reported.

Hospitals play a significant role within the public health framework, providing an environment abundant in materials and organic waste that serve as food sources for various arthropod species. The presence of insects in a hospital setting is concerning due to its associated risks to patients, visitors, and healthcare professionals. It can lead to health disturbances and raise concerns regarding the potential transmission of infectious diseases. In the last two decades, there has been a resurgence in bed bug infestations, a notable nuisance and well-studied phenomenon in terms of public health (Sheele et al., 2017; Sheele et al., 2021a; Sheele et al., 2021b; Sheele, 2022).

In June 2019, an investigation was performed to understand an outbreak of erythematous maculopapular lesions of unknown origin in a surgical ward from the University Hospital Walter Cantídeo (HUWC). HUWC is a tertiary care teaching hospital with 243 beds, eight Operating Rooms, six Clinical Intensive Care Unit (ICU) beds, three Post-Operative ICU beds, and six beds for Post-Anesthetic Recovery, distributed in three buildings.

Thirteen patients in the surgical ward were identified with diffuse erythematous maculopapular lesions. Similar signs and symptoms were also found in health professionals of the same unit. Other wards, such as ICU and Post-Operative ICU, did not present similar cases. Most lesions were in the posterior region of the forearm, lower limbs, trunk, rarely face, and extremities (Figure, A-D). Some lesions present a line pattern, others with a zigzag pattern. All patients received antihistamines with the resolution

of symptoms after one week. A technical visit was conducted, and hypotheses were generated through brainstorming, including drug reactions and bites from arthropods such as diptera (*Aedes aegypti*, phlebotomine sand flies and others). The cause became apparent when the professionals exposed the furniture in disrepair, which contained bed bugs.

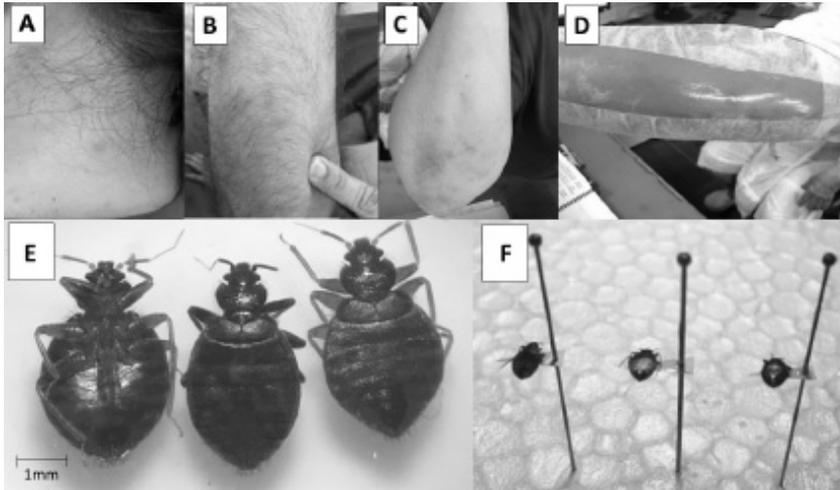


Figure. A-D. Multiple erythematous lesions on the neck and on the upper limbs. E-F. *Cimex lectularius*. Specimens collected during the technical visit.

The problem was presented to all sectors: hospital management, infection control committee, epidemiology and hospitality department. Interviews with victims of bed bug bites in the surgical wards were performed. Photographic records of compromised hospital environments, bites on victims, and bed bugs were taken. Samples of bugs were collected for laboratory analysis. Insects were observed mainly on benches, places used to access computers. Bed bugs and its eggs were also found in wooden cabinets in poor condition, running on the walls, nurses' parapets, and others torn.

About 10 specimens of *Cimex* sp. (Figure, E-F) collected in the hospital were also analyzed by the Parasitology Department from the Federal University of Ceará. An entomologist was requested to assist in the entomological diagnosis and control measures. Morphological characters were examined under a Leica MZ APO stereoscopic microscope and by Topcon SM-300 SEM. After taxonomical analysis, the specimens were identified as *C. lectularius* (Figure, E-F).

Data was collected according to the technical reports performed during infestation inspection. The study was approved by the Research Ethics Committee of HUWC (CAAE: 61739422.0.0000.5045).

A multifaceted approach was chosen to control the infestation. The process began with the evacuation of people from the units. There was removal of damaged wood, vacuuming in the areas diagnosed before chemical control, chemical fumigation with liquid insecticide, and cleaning after 12 hours of fumigation. The disinfection process lasted four days. The units resumed regular operation, and there were no new complaints of pruritus associated with skin lesions. In November 2019, a new visit was carried out. No signs of bed bugs were identified, nor new victims emerged, and the control of the infection was confirmed.

C. lectularius is the most common bed bug found in reported infestations (Bandyopadhyay et al., 2015; High, 2017; Sheele et al., 2017; Sheele et al., 2021a; Sheele et al., 2021b; Sheele, 2022). They are small insects ranging from 4 to 7 mm in the adult phase, with an oval and flattened body shape, red brown in color, which varies according to ingested food, with widely separated eyes and reduced wings that do not allow them to fly. Its life cycle has three stages (egg, nymph, and adult stage), and blood is essential to evolve from one stage to the next. They are nocturnal, and their bite is usually painless (Usinger, 1966; Akhoundi et al., 2020). They typically hide during the day in crevices and cracks in mattresses, wood, bed frames, door baseboards, and walls close to the power supply, which we believe occurred in the furniture located in the surgical ward. Clinical manifestations range from asymptomatic bites to highly pruritic skin reactions. Complications may vary from skin and soft tissue infections secondary to scratching, anemia, anaphylaxis, insomnia, and psychiatric disorders (High, 2017; Sheele et al., 2017; Sheele et al., 2021b; Sheele, 2022).

Bed bugs are insects with worldwide distribution and whose bite may generate, among other discomforts, intense itching with the risk of complications after scratching. Publications in the medical literature regarding bed bug outbreaks in hospitals have been reported in emergency rooms and psychiatry departments, but none in surgical ward settings (Bandyopadhyay et al., 2015; Sheele et al., 2021b). Bandyopadhyay et al. (2015) reported a bed bug outbreak in a neonatal unit with 39 individuals. In this report, the outbreak not only affected the admitted newborns and mothers but also impinged the health professionals and their families – similar to our report (Bandyopadhyay et al., 2015). Sheele et al. also documented numerous bed bug outbreaks, mainly in the emergency departments. Most of these outbreaks were related to the acquisition of bed bugs in the home and posterior spread to hospital settings (Sheele et al., 2017; Sheele et al., 2021b; Sheele, 2022).

Bed bugs may pose health risks to patients and health professionals. Complications are immediate allergic reactions, secondary infection, and consequent sepsis (Sheele, 2022). Anemia and respiratory infections have also been described (Sheele et al., 2021b; Sheele, 2022). There is no proven evidence that bed bugs may transmit bloodborne diseases such as HIV and hepatitis. In addition, bed bugs have been suspected of transmitting infectious agents. Over 40 microorganisms have been considered strong candidates to be transmitted by bed bugs, although this evidence is still incomplete (Goddard & Shazo, 2009; Delaunay, 2011). In our series, no infectious complications were reported, although some professionals with mental health comorbidities presented exacerbation.

An individual probably took the patient to the hospital context, and the parasites were installed due to the bad conditions and lack of maintenance of hospital equipment. We believe that the presence of wooden furniture in a bad state of conservation and without maintenance led to the installation of these arthropods. According to the Brazilian National Health Surveillance Agency, services must keep the physical facilities of the external and internal environments in good condition, safe, organized, comfortable, and clean. They must also carry out preventive and corrective maintenance actions of the building facilities, either in-house or outsourced (Goddard & Shazo, 2009; Delaunay, 2011; Parola & Izri, 2020; Dellatorre & Haddad, 2021). Mechanical management methods (brushing, vacuuming, heating, washing, or freezing) are usually efficient at the individual house level to eradicate the bugs (Delaunay, 2011).

To the best of our knowledge, no other similar nosocomial infestation has been reported in Brazil. Most publications focus on the dermatological aspects of individual cases and biological distribution (Criado et al., 2011; Delaunay, 2011; Dellatorre & Haddad, 2021). In Brazil, clinical data regarding bed bugs is very scarce. Pereira et al. (2018) reinforce that the number of bed bug infestations in Brazil has increased over the recent years. Unfortunately, most infestations are underreported. Data generated through questionnaires have shown bed bugs distribution across Brazil in all regions. Among the responses to the questionnaires, only 14% indicated that they had traveled abroad, suggesting that bed bugs are well-established in Brazil (Pereira et al., 2018). More studies are necessary to understand better the distribution of bed bugs in hospital settings in Brazil.

Recommendations about managing bed bugs are focused on house control of plagues. Bed bug outbreak control is challenging, and there are no formal guidelines from professional medical societies on managing bed bug infestation in hospital settings (Parola & Izri, 2020). These recommendations can be extrapolated to the hospital environment when linked to the maintenance of the hospital environment and its resources (Bandyopadhyay et al., 2015; Parola & Izri, 2020; Dellatorre & Haddad, 2021). Our suggestions

in the face of a bed bug infestation are: 1) keep the patients' items in sealed plastic bags and/or frozen until the next day; 2) use mechanical methods such as steam cleaners in the patient's room, as well as the material in contact with the patients; 3) inspect wheelchairs, beds, door baseboards, and walls, and remove in the case of bed bugs; 4) alert the infection control commission for the implementation of control measures. Eradication is usually linked to early detection, and although chemical methods were also used, these methods are commonly unnecessary (Dellatorre & Haddad, 2021). If there is a high suspicion of a bed bug infestation, we recommend the inspection of rest areas, such as beds, sofas, and their surroundings, must be conducted meticulously, which often requires an experienced professional (Dellatorre & Haddad, 2021). There are modern methods to detect bed bugs with attractant-based bed bug traps ("monitors" or "interceptors"), and they may be useful (Parola & Izri, 2020).

Our report corresponds to a rare and unique infestation of bed bugs in a surgical ward, which is a place frequently controlled to ensure maximal quality and safety in a health environment. In conclusion, active surveillance on the hospital's physical facilities is necessary to prevent arthropod infestation. Given the difficulty in carrying out pest control in a hospital environment, this report corroborates to the importance of alerting about pest prevention in the hospital environment. Healthcare providers need well-established policies and protocols for surveillance, preventive measures, and action during bed bug infestations.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest to disclose.

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