Direct and indirect health effects of bedbug infestations

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CPHA Pre-conference Session

Sunday, June 13
Outline of the presentation

• A quick biology
• Medical diagnosis
• Health effects
Bed bug biology

• Scientific name:
  ➢ *Cimex Lectularix*

• Oval flattened body (female is more round), without wings ➜ 4 to 7mm long.

• Food source:
  ➢ Human blood
  ➢ Feeding time: 10-15 minutes
  ➢ After having fed, 4 to 7 days without feeding
  ➢ Attracted by vibrations, heat, odors and CO₂
Bed bug biology

- Unlike lice, bedbugs do not stay on the human body after a blood meal.
- Maximal activity between 03:00-06:00 am *
- Red, visible and very vulnerable to natural predators
  - Photophobic
  - Thigmotactic
  - Near its feeding sites, hence beds, bed boxes, furniture or any object close to the bed
  - Lays its eggs in the same areas
At risk sites

- Buildings with many night visits by different individuals.
- Increase risk of transmission and proliferation
  - Hospitals
  - Motel/hotel
  - Multiplex
  - Halfway houses
  - Student housing
  - Long term care center
  - Etc.

- Transmission risks greater than prolifération risks
  - Daycare
  - Schools
  - Skyscrapers
  - Used goods stores
  - Etc.
How to establish the diagnosis
Medical diagnosis

• Lesion sites
  - Areas that are exposed during sleep
    - Arms and shoulders
    - Legs
    - Rarely in the face
    - Cluster or linear configuration

• Timing of the lesions
  - Lesions are present when one wakes up in the morning
  - Pruritus is more intense in the morning. Diminishes during the day.

• Morphology of the lesion
  - Erythematous indurated papules
    - Usually a central punctum

• Who is bitten
  - Bedbugs are attracted by heat, hence will bite preferentially the individual that emits more heat.

• Context
  - When only bed bugs can bite (hence not exposed to other biting insects)
Health effects
Health effects

- Dermatologic (allergic and infectious)
- Mental health
- Improper insecticide use
- Access to health services
Dermatological problems associated with bed bugs

- Type 1 allergic reactions
  - Erythematous macules
  - Erythematous papules
  - Urticarous papules
  - Bullae (sometimes hemorrhagic)
  - Anaphylaxis

- Type 3 allergic reactions
  - Serum sickness

- Type 4 allergic reactions
  - Papular urticaria
  - Hypertrophic scaring and cheloids
  - Cellulitis
Type 1 allergic reactions
Erythematous papules

- Indured erythematous papules
  - Central punctum
  - Grouped and sometimes linear
- Four out of five individuals will have this reaction
- Resembles a mosquito bite

- Treatment of symptoms
  - Topical corticosteroids
Type 1 allergic reactions
Giant urticaria

- Giant urticaria
- Formation of wheals with intense pruritus
  - Rare
- Treatment of symptoms
  - Oral antihistaminics
Type 1 allergic reactions
Bullae (sometimes hemorrhagic)

- Treatment:
  - Oral corticosteroids and antihistaminics
  - Topical corticosteroids
  - Prophylaxis with oral and topical antibiotics


Type 4 allergic reactions
Papular urticaria

- Papules from 3 to 10 mm, sometimes with an overlying vesicle
- Last from several days to several months
- Cluster configuration
- More often in kids 2 to 5 years old
- Treatment: topical corticosteroids

Health effects: Dermatological differential diagnosis

• Scabies
  - Usually found in both hands and covered area of the skin (axilla, peri-umbilical regions).
  - Acral furrows
  - Mite is identifiable with microscope

• Fleas
  - Ankle and calf
  - Domestic animals are often present

• Bites by mosquitoes, black flies, horse flies, etc.
  - Similar lesions
  - Exposure history to those biting insects.

Alan N. Binnick & Thomas P. Habif, Dartmouth Medical School, New Hampshire: DermNet.com
Google images
Health effects: Dermatological differential diagnosis

- Drug reaction
- Allergic contact dermatitis
- Atopic dermatitis
- Gianotti–Crosti syndrome
- Pityriasis lichenoides et varioliformis acuta
- Ecthyma
- Dermatitis herpetiformis
Skin infections

• Cellulitis:
  - Bacterial infection of the skin
  - Usually follows scratching because of pruritus
  - Rare
  - Treatment: antibiotics
Anxiety and sleep quality

- No formal studies
- Non published case reports
  - Vulnerable individuals may decompensate → may lead to worsening of depressive and psychotic states
- Association between mental health is demonstrated for pruriginous diseases and insect bites (but not bed bugs)
  - Anxiety
  - Sleep quality
  - Social isolation
Montreal case series (non published)

• Social isolation
  – Adult: 16/27 (59%)
  – Children: 3/25 (12%)

• Sleep quality
  – Adult: 17/27 (63%)
  – Children: 19/25 (76%)
Sleep quality and health effects

- Variable attention and poor focus
- Mentally slow and inaccurate
- Emotionally labile
- Unreliable memory
- Risk taking
- Weak executive decision making
- Feel tired, stressed, exhausted
- No insights or creative solutions
Sleep quality and health effects

- Obesity
- Hypertension
- Diabetes
- Inflammatory markers increased
- Increased mortality
Interaction between disabilities and infestations

• Groups with functional or cognitive disabilities
  ➢ Inability to protect themselves
  ➢ Severe infestations for these individuals
Anaemia

- Anaemia

  - Case report of a patient that developed anaemia because of a severe infestation (ad 52g/L)

Infections

• Bed bugs do not transmit blood borne viruses.
  – Logical from an evolutionary standpoint?
  – Biologically plausible
  – However, bed bugs only attack humans (unlike, for example, ticks and mosquitoes)
    • Limits the possibility of zoonosis
  – Usually only one human (unlike mosquitoes)
    • Any potential infectious agent would have a very low basic reproductive rate
Health impacts of inappropriate use of pesticide

• Improper use of pesticides
  - Pyrethrinoid
  - Organophosphates
  - Carbamates
Health impacts of inappropriate use of pyrethrins

• Acute effects
  – Paresthesia
  – Inhalation possibly associated with exacerbation of asthma and rhinitis
  – May be lethal if important quantities are ingested.
Health impacts of inappropriate use of organophosphates and carbamates

Acute effects

• Cardiovascular
  • Bradycardia, hypotension
• Respiratory
  • Rhinorrhea, bronchorrhea, bronchospasm, cough, severe respiratory distress
• Gastrointestinal
  • Hypersalivation, nausea and vomiting, abdominal pain, diarrhea, fecal incontinence
• Genitourinary
  • Incontinence
• Ocular
  • Blurred vision, miosis
• Glands
  • Increased lacrimation, diaphoresis
Chronic health impacts of inappropriate use of pesticides

- Possibly cancer and developmental problems (cognitive and motor)
Health Impacts

• In areas with chronic bed bug infestations
  – Almost always accompanied by
    • Water infiltration
    • Cockroach
  – Often with
    • Mice
    • Rats

• Hence asthma, rhinosinusitis, URTI, etc.
Future research on health problems

• Asthma
Conclusion

• Bed bugs is a public health problems
• Health effects are direct (dermatological), indirect (pesticide)
• Probably affects mental health
• Often is accompanied by other housing risk factors affecting health