Bed bugs: What to do about unwanted houseguests

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June 20, 2012; AIHce 2012 PO121

Indianapolis, IN




National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

BC Centre for Disease Control
An Agency of the Provincial Health Services Authority

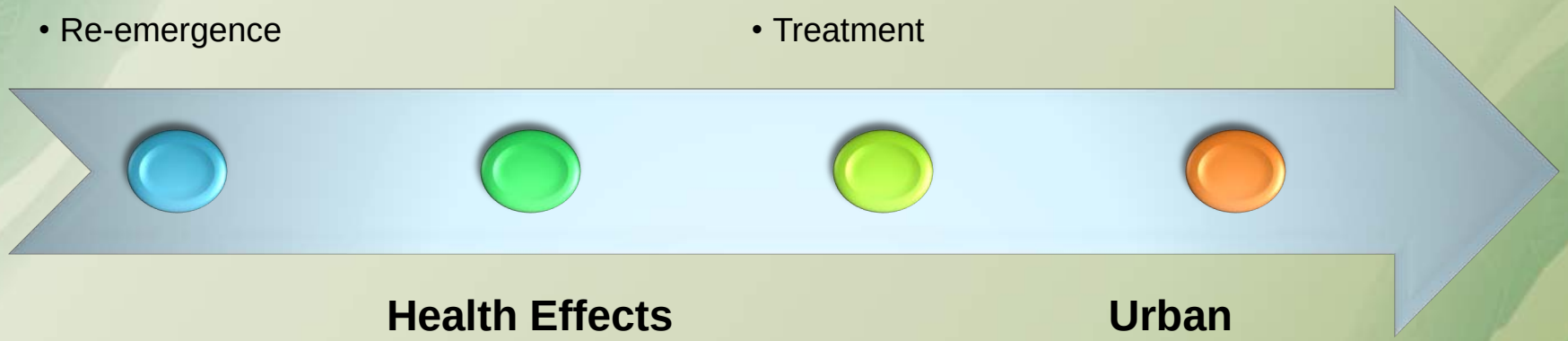
Outline

History

- Biology/behaviour
- Re-emergence

Management strategies

- Prevention
- Identification
- Treatment



Health Effects

- Disease transmission?
- Physical health
- Mental health
- Insecticide exposure

Urban Canadian Experiences

- Winnipeg
- Toronto
- Montreal
- Vancouver

1. Biology and Behaviours
2. Re-emergence of bed bugs

HISTORY

1. Biology and Behaviour

- Cimex lectularius
  - Small elusive insects (6-7 mm),
  - Feed on blood of mammals
  - Photophobic, nocturnal
  - Lay up to 5 eggs/day, 200-500 over lifespan
  - Life cycle can occur in 5 wks - 30wks
  - Reported to survive 4 months to 1 year without feeding

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2. Re-emergence of bed bugs

- Early 20th century, bed bugs were not uncommon in developed countries
- Decline in infestations in the 1940s
  - Organochlorines (DDT) organophosphates, carbamates
  - Non-specific and preventative applications were common (now discouraged)
- International travel

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2. Re-emergence of bed bugs

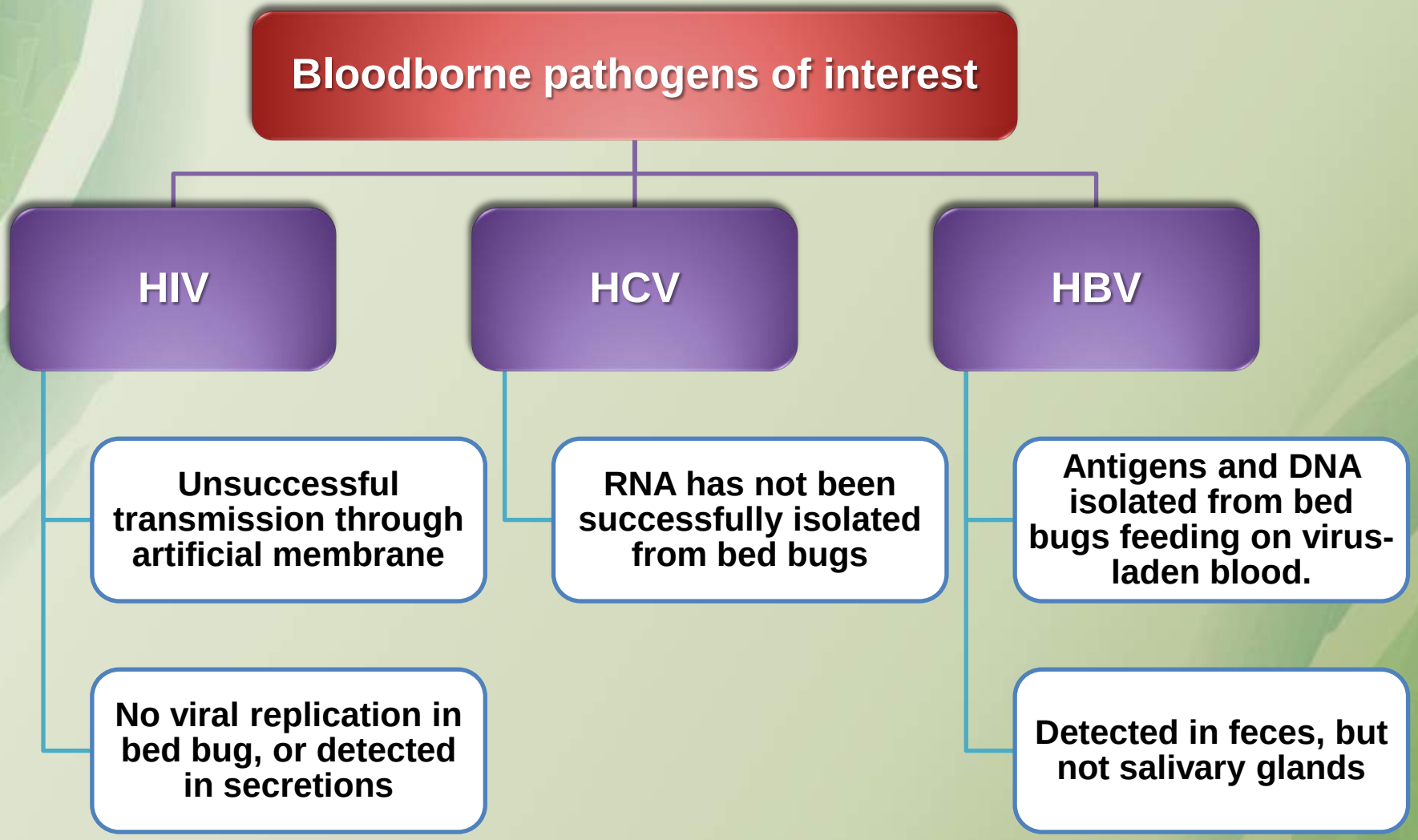
- Alarming number of bed bug infestations observed in the last decade
  - North America, Europe, Australia, Asia, and Africa
- Particularly in high density settings
  - Hotels, college dormitories, multi-family housing units, hospitals, etc.
- Limited scientific evidence that evaluates bed bug management options
  - attention given by public, researchers, government agencies, pesticide companies

1. Bed bugs as vectors for disease transmission
2. Physical health impacts
3. Mental health impacts
4. Insecticide exposure

HEALTH EFFECTS

1. Bed Bugs as Vectors for Disease Transmission

- Studies on vectorborne transmission
  - Pathogen
    - Isolation
    - Replication
    - Detection in exposed host
  - Transstadial (pass between stages in development)
  - Transovarian (pass to offspring)
  - Animal models


Bloodborne pathogens of interest
HIV
HCV
HBV
Unsuccessful transmission through artificial membrane
No viral replication in bed bug, or detected in secretions
RNA has not been successfully isolated from bed bugs
Antigens and DNA isolated from bed bugs feeding on virus-laden blood.
Detected in feces, but not salivary glands

2. Physical health impacts

Allergic reactions, hypertrophic scarring, hives, lesions

- Salivary proteins may sensitive individuals to further bites

Systemic health effects

- rare; individuals with underlying health conditions
- Reports of anaemia, asthma, anaphylaxis

Drug reactions, infections, allergens, and bites by other insects ***may cause similar skin reactions***

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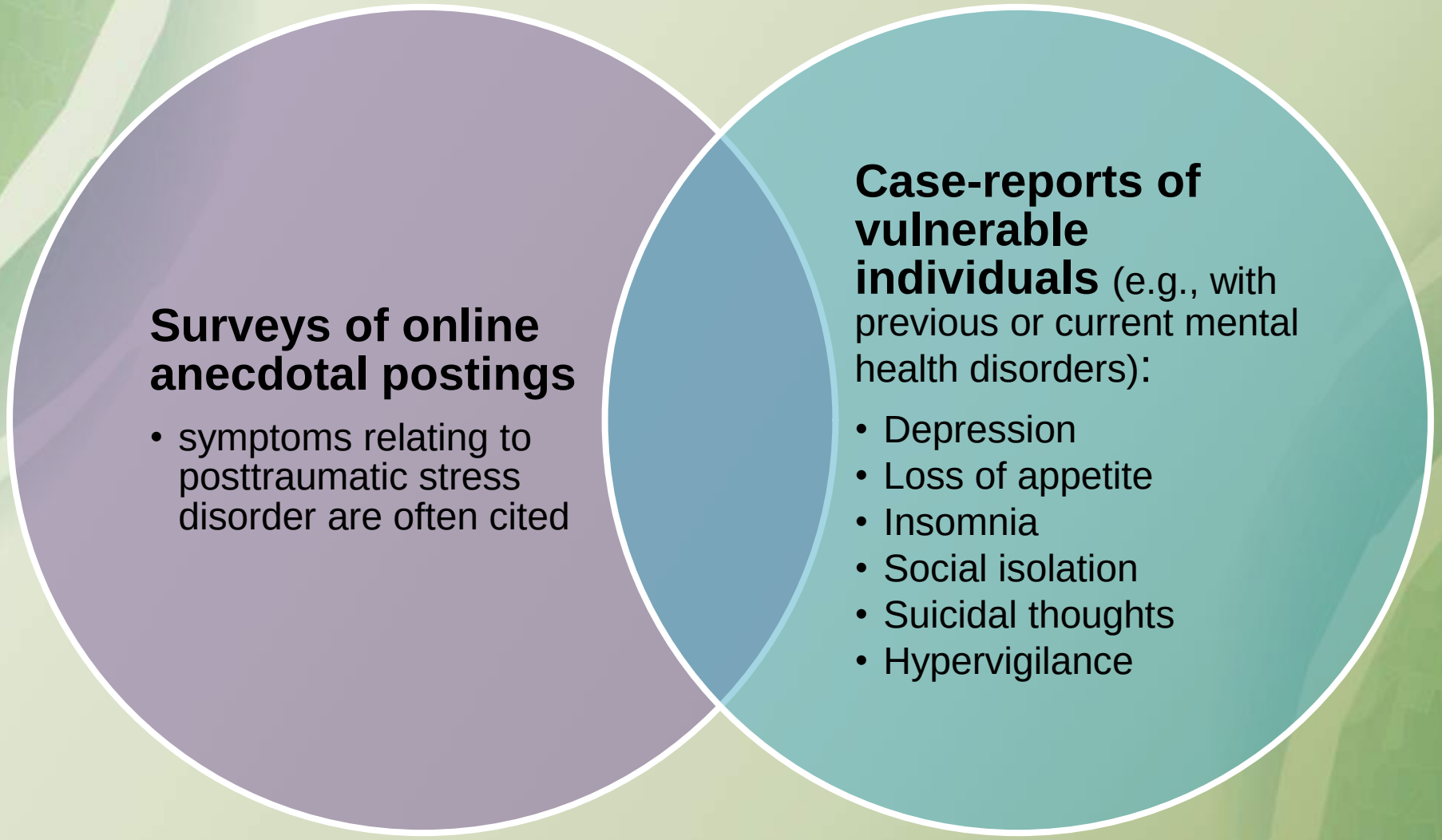
3. Mental Health Impacts



4. Insecticide Exposure

Acute health effects

- Neurologic, respiratory, cardiovascular, gastrointestinal, ocular, death
- US report identified 111 cases of illness associated with pesticide exposure during bed bug treatments in 3 states from 2003-2010
  - one fatality (case had underlying health conditions)

Chronic health effects

- Limited evidence
- Cancer, developmental effects

1. Prevention
2. Identification
3. Treatment

MANAGEMENT STRATEGIES

1. Prevention

Eliminate entry points and harbourage sites

- **Building maintenance**
- **Sealing cracks/crevices**
- **Clutter removal**

Prevent ingress and migration

- **Second-hand items, luggage (guidelines, inspection)**
- **Isolation of bed and furniture**
- **Moat-style interceptors, monitoring devices**
- **Encasements**

2. Identification

Clinical signs of bed bug bites

- Some individuals are asymptomatic

Inspection by qualified person (e.g., pest control professional, entomologist)

- Live/dead bugs, molted skins, fecal deposits, blood stains, odours

Identify harbourage sites

- Canine detection units, clutter removal, vacuuming

Estimate population

- Moat-style interceptors, monitoring devices

3. Treatment

Assess extent of infestation, implement specific controls in a safe manner

- regulatory officials, building management, pest management professionals, residents

Preparation

- Clutter removal
- Disposal of infested items
- Encasements
- Vacuuming

Treatment carried out by qualified person

Non-chemical treatment

- Heat living spaces, containerized heat
- Steam
- Freezing
- Laundering
- Diatomaceous earth

Chemical treatment

- Pesticides, fumigation (pyrethroids, dichlorvos, chlorfenapyr)

Ongoing monitoring and prevention

- Education may increase early detection and improve outcomes of treatment

1. Winnipeg
2. Toronto
3. Montreal
4. Vancouver

URBAN CANADIAN EXPERIENCES

Who Responds to Bed Bug Complaints?

- Montreal, Winnipeg, Vancouver – City Inspectors
- Toronto – Public Health
- Montreal, Toronto, Winnipeg
  - Dedicated resources
  - Track complaints
- Vancouver
  - No surveillance
  - No funding

What seems to contribute to success?

- $$$
- Public health involvement
- Surveillance
- Partnerships & collaboration
- Education
- By-laws requiring cooperation between tenants and landlords
- Pest management certification or submission of control plans?


National Level
Find least toxic pesticide alternatives
All levels of government
Treat bed bugs as public health threat
At all levels of government
Public health can be involved in surveillance
Individual Level
Prevent, recognize early, ensure best practices used to control
Local level
Public health can facilitate collaboration and educate public and others
What can be done?

Conclusion

No evidence that bed bugs transmit disease, but the health effects (physical and mental) can be severe.

Control of infestations involves prevention, early detection, and implementation of best practices for treatment.

Education, partnership and collaboration, and surveillance are very important for dealing with infestations.

Cities need dedicated resources, public health involvement, and regulatory authority to deal with bed bugs.

Thank You

Questions?
Comments?

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