DEVELOPING A STRATEGY FOR MANAGING BED BUGS IN HOMELESS SHELTERS

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WHAT IS IPM?

- An environmentally sound approach to pest control
- Inspection based
- Quality pest control using the least hazardous chemicals and techniques
- “best management practice” for pests

A DEFINITION:

- IPM is a strategy based on multiple control tactics to ensure that:
  - pest populations are managed at acceptable levels
  - risks to people, other non-target organisms and the environment are minimized
  - pest control is practical and economical

COMPONENTS OF IPM

- Pest Identification
- Monitoring
- Thresholds to determine actions
- Environmental modifications
- Compatible control tactics
- Cooperation

THE BED BUG TACTICAL PYRAMID

Pesticides

Physical controls (heat, cold)

Mechanical controls (traps, barriers, etc.)

Environmental modifications (Quarantine / clutter management / shelter design)

SOME LEGAL ISSUES

Sec. 1951.459. PEST CONTROL SERVICES FOR CERTAIN BUILDINGS. The owner of a building that is an apartment building, day-care center, hospital, nursing home, hotel, motel, lodge, warehouse, school, or food-processing establishment, other than a restaurant, retail food, or food service establishment, may obtain pest control services for that building from a person only by:

1. Contracting with a person who holds a license to perform the services, or
2. Requiring a person employed by the owner who is licensed as a certified noncommercial applicator or technician to perform the services.
LEGAL ISSUES: LICENSE REQUIREMENTS FOR BED BUG CONTROL

- Non-commercial applicator’s license required
- Even if you are using pesticides purchased at the grocery store or other over-the-counter retailer
- Applies to any pest (bed bugs, cockroaches, ants, rodents, etc.)
- Designed to protect lodgers, renters
- Cost: $108 applic fee + $128 exam fee. Annual renewal $100 and CEU costs.

LEGAL ISSUES: PESTICIDE LABELS

- The pesticide label is a legal document
- Failure to follow label directions will subject you to state, federal penalties, possible jail time

MONITORING: THE KEY TO EARLY DETECTION

WHY YOU CANNOT RELY ON COMPLAINTS TO MANAGE BED BUGS

- Some may be embarrassed to complain
- Many will not know signs of bed bugs
- Most people do not react to bed bug bites
  - In apartments less than half of infested units knew (or admitted they knew) they had bed bugs
  - Perhaps as few as 5% of individuals react strongly to bed bug bites

EARLY DETECTION IS KEY

- Early infestations of bed bugs usually confined to bed or within 5 feet of bed
- Advanced infestations spread away from bed, spreading problem

Small infestations of bed bugs stay together
VISUAL MONITORING IS NOT ENOUGH

- Skill and thoroughness of technician inspectors highly variable
- Extremely time consuming when done right (at least 10-15 minutes per bed)
- Disruptive of resident’s privacy
- Limitation of even best inspector to always find low level infestations

24/7 BED BUG MONITORS

- BDS “Slider” bed bug detector between mattress and box spring
- 24/7 BED BUG MONITORS

- Verifi active bed bug detector showing captured bed bugs. Verifi stations had the highest rate of disturbance in our study
- 24/7 BED BUG MONITORS

- Climbing bed bug detectors after removal from foot of a bed
- 24/7 BED BUG MONITORS

TYPES OF BED BUG Monitors

- Active Monitors contain or use CO2 or other attractants to entice bed bugs into a trap
- Examples: Verifi, Volcano, Climbs, Blackout
- Costs range from $30 to about $4 per station.
- Use in empty rooms only

PASSIVE MONITORS

- Passive monitors rely on bed bugs blundering into the trap. They can be surprisingly effective, especially when placed in multiple locations around a room.
- Examples: BDS Slider trap (sticky trap), Climbs, Blackout (pitfall traps), Volcano (inset)
- Costs: $1 to $5 each
STICKY TRAPS WERE LEAST EFFECTIVE IN OUR TRIALS (BUT THEY WORK WELL ON COCKROACHES)

PASSIVE TRAPS: THE MORE THE BETTER

LIMITATIONS OF PITFALL TRAPS

- Can be disturbed by residents
- Fill with dust, detritus and must be cleaned regularly
- Can be difficult to place, remove
  - Bunk beds, other heavy beds
  - Beds surrounded by clutter, furniture or next to walls
- Time consuming to search for bed bugs

Bunk beds heavy to move and inspect. Climbbugs – a two person operation

PITFALL TRAPS

- Despite limitations remain the most efficient and economical bed bug detectors

ABOUT DOGS

- Dogs can be trained to smell bed bugs
- Dog handler teams vary in skill and competence
- Best handlers can do very high level work
- Studies have show that rates of false positives and negatives vary according to team and from day to day
- Positive hits should be visually verified
NEXT STEP: KEEP BED BUGS OUT

- Quarantines are part of many IPM programs
- Often less expensive to keep pests out than treat them once they are in

BED BUGS ENTER SHELTERS

- Donated furniture/clothing
- Through client belongings
- On client’s person
- Rare but possible
- On staff belongings
- From own infested apartments, home visits

INFESTED BEDDING, FURNITURE IS COMMON

- Disinfest or avoid taking in used furniture from untrusted sources
- Especially important for nonprofits
- Do you have a disinfestation protocol?
- Furniture rental companies
- Outgoing furniture should be clearly marked or destroyed if infestation suspected

REQUIREMENTS FOR QUARANTINE TREATMENTS

- Must be fast
- Effective against all life stages
- Affordable
- Not damaging to belongings
- Respectful to client

OPTIONS FOR DISINFESTATION

- Heat kills bed bugs (min. one hour at 122°F)
- Dists 30 minutes on HOT
- Hot rooms or chambers
- Solarization (summer only)
- Washing
  - 120°F to 140°F for 30 minute wash cycle
  - Cold (not very effective)
- “Bag in a bag™”, Nuvan® strips
- Long-term quarantine
  - 3-5 months

SOLARIZATION

Lethal temperatures for bed bugs

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Adult</th>
<th>Eggs</th>
</tr>
</thead>
<tbody>
<tr>
<td>113°F</td>
<td>90</td>
<td>360</td>
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<tr>
<td>118°F</td>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>122°F</td>
<td>0</td>
<td>0</td>
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Solarizing a mattress and box spring
ISOLATION ROOMS

- Separate storage room or building
- Room can be treated and monitored
- Reduces clutter in dorm areas
- Long-term storage (3-5 months) will starve bed bugs

Disadvantages
- Requires space, manpower, maintenance, organization
- Clients may not like limited access to personal items

SANITATION AND BED BUGS

- Bed bugs do not require poor sanitation
- Disadvantages of clutter
- Difficult to access for monitoring
- Provides more harborage for bugs
- More difficult to treat
- Reduces overall livability
- Dust, dirt interfere with monitor cups

SHELTER DESIGN ELEMENTS & BED BUGS

- Bed construction
  - Worst: no bed legs, allows continuous contact with floor
  - Better: Plywood or wood bed on legs;
  - Better: wood painted white or light color
  - Better: Metal bed or frame
  - Best: Bed frame only, encased mattress and box spring

At least with a painted bed you can see signs of bed bugs.

What was the problem here?

What are the positive and negative elements in this setting?
SHELTER DESIGN ELEMENTS & BED BUGS

Carpet tack strips provide harborage for bed bugs.

SEALING AND CAULKING CAN HELP

- Eliminating harborage for bed bugs

BED BUG TREATMENT OPTIONS

- Whole building and room heat treatments
- Physical controls
- Heat spot treatment
- Cold treatment
- Mechanical controls
- Encasements or seamless mattress
- Bed isolation with interceptor cups
- Vacuuming
- Pesticides
- Fumigants
- Dusts
- Sprays and aerosols

WHOLE BUILDING HEAT TREATMENT

- Choose company with experience doing whole building treatments
- Do they have capacity to treat entire building at once?
- How will they monitor temperatures and ensure heat distribution?
- Good choice for smaller, complex or cluttered structures with advanced bed bug problem

FANS AND MONITORS

WHOLE BUILDING HEAT TREATMENT

- May be less disruptive than chemical treatments in heavy infestations
- Often more expensive
- Propane or electric heat?
  - Propane faster, hotter; requires careful oversight
  - Propane must be run outdoors
  - If electricity, will company provide power?
- Requires building prep
  - Planning/Installing fans, thermometers
  - Protecting sprinkler systems
  - Positioning mattresses, box springs
The objective of room prep is to allow heat/air circulation.

**PARTIAL BUILDING HEAT TREATMENTS**

- When not possible to do whole structure treatment at one time
- May allow bed bugs to escape/avoid treatment as heat moved and repeated in different areas
- Consider combining with residual insecticides
- Consider warranty and how you will monitor success of treatment
- Feasible to do in-house
- May require pesticide license
- Investment in equipment, training

**SPOT/COMBINATION HEAT TREATMENTS**

- Spot treat infested furniture
- Put all furniture into one room and heat treat
- Spray and dust empty rooms before resuming furniture
- Use portable heat-treat tent
- Quarantine purposes
- Treat infested beds, furniture
- $5 to $10K for automated units

**VACUUMING**

- Supplement to other treatments
- Good for initial knockdown of high bed bug populations
- Helps for later inspections
- Use crevice tool for most sites
- Gently scrape nozzle along fabric
- Dedicated one (HEPA) vacuum and discard bag after use
- Vacuums will not remove all eggs

**STEAMING**

- A clean approach
- Kills all stages of bed bugs via high temperature
- Supplement to other methods
- Penetrates through fabrics, cracks
- Especially helpful on furniture, upholstery
- Slow, 1 foot/10-15 seconds
- Choose dry steam (low vapor rate) units

**BARRIERS**

- Can be effective and economical
- Especially effective with motivated individuals
- Barrier types
  - Encasements
  - Interceptor cups
MATTRESS/BOX SPRING ENCASEMENTS

- Work by eliminating most crevices and trapping live bed bugs inside
- Facilitates inspection
- Avoids need to dispose of infested bedding
- Purchase encasements that have been tested against bed bugs
- Bite proof
- zipper tightness and security
- Protecting the encasement is important

ENCASEMENTS ARE EASY TO INSPECT, BUT…

- Won’t guarantee bed bug protection unless inspected regularly

PROTECTING ENCASEMENTS

- Remove box spring plastic corners, any staples or sharp objects
- Cover screw heads, sharp edges of bed frames
  - Adhesive felt
  - Duct tape
- If damaged, repair or get new encasement

ALTERNATIVE TO COVERS

- What is good and bad about this bed setup?

INTERCEPTOR CUPS AS CONTROL DEVICES

- Work on footed beds
  - Not for platform, water beds
- When all feet are cupped provide protection when bed is not touching wall or furniture
- Work best with motivated clients
- Must be maintained, cleaned
- Can also serve as monitoring station

TYPES

- Blackout™ Bed Bug Detector
  - $5.17 retail through manufacturer
- Climbup® Insect Interceptor
  - [www.insect-interceptor.com](http://www.insect-interceptor.com)
  - $2.83 retail through Amazon
CLIMBUP

- Advantages
  - Economical
  - Stackable for easy storage
  - Effective
  - Comes in large sizes for larger furniture
  - Translucent plastic facilitates flashlight inspections
- Limitations
  - Needs redusting with talcum periodically
  - White color is noticeable
  - Tape eventually peels
  - Overall less durable

PROBLEMS

BLACKOUT

- Advantages
  - Easy to inspect
  - Heavy duty black plastic is durable, unobtrusive
  - Does not use tape or talc
  - Effective
- Limitations
  - More costly
  - Not easily stackable

PESTICIDES FOR BED BUGS

- Bed bugs are tolerant of many insecticides
  - Pyrethroid resistance well documented
  - Few effective, residual treatments
- Types of formulations
  - Aerosols
  - Dusts
  - Fumigants
  - Sprays

AEROSOLS

- Contact sprays
  - Pyrethrins (several Trade names)
  - EcoRaider and Bed Bug Patrol
  - Pyrethroid sprays (Zenprox, others)
- Residual sprays
  - Aerosols with Phantom (chlorfenapyr), dinofuran (Alpine) or imidacloprid
  - Combination sprays:
    - Temprid, Tandem, Transport
BEST BOTANICAL BASED PRODUCTS

- EcoRaider™ – equivalent in direct kill, egg kill, to top professional sprays according to Rutgers University studies
  - 1% geraniol, 1% cedar extract, and 2% sodium lauryl sulfate
- Bed Bug Patrol™ – good contact killer
  - 0.003% clove oil, 1% peppermint oil, and 1.3% sodium lauryl sulfate
- Forget alcohol, bleach

DUSTS

- Limited where they can be used
- Most for VOID areas only
- Dessicants
  - Diatomaceous earth (pest control grade)
  - Silica aerogel (TriDie, Cimexa)
- Pyrethroid dusts
  - Tempo
  - Deltain
  - Other dusts
  - Alpine

THIS IS AN ILLEGAL APPLICATION OF A DUST

FUMIGANTS

- Fumigants are insecticides that volatilize at room temperature
- Available fumigants
  - Sulfonyl fluoride
    - Used for tent and vehicle (moving truck) fumigation
    - Requires licensed fumigator
  - Dichlorvos
  - Nuvan Prostrips
    - Used for fumigating closets, bagged goods
  - Cold-pressed neem oil
    - Cirkle (rag in a bag) for fumigating bagged goods

AN INTEGRATED APPROACH WORKS BEST

- Quarantine
- Monitoring (visual and trapping)
- Education (encourage reporting, cooperation with monitoring, treatment)
- Environmental modifications (beds, walls, floors, ceilings)
- Physical controls (heat, steam)
- Mechanical controls (vacuuming, barriers)
- Chemical controls (dusts, sprays, aerosols)

PANEL DISCUSSION TOPICS

- Dealing with clutter
- Making quarantines work
- Licensing issues
- Educating residents and staff
- Getting residents to buy-in on pest control program
- Choosing a good pest control company