

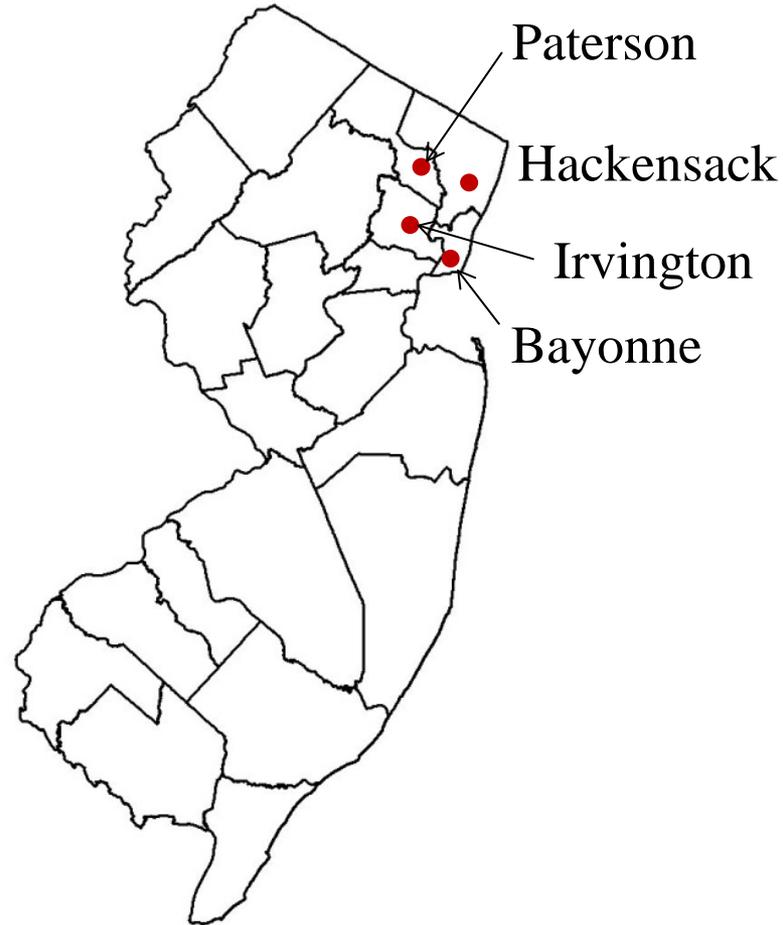
Bed Bugs - How the Latest Research in Affordable Housing Will Help Residents and Save Money

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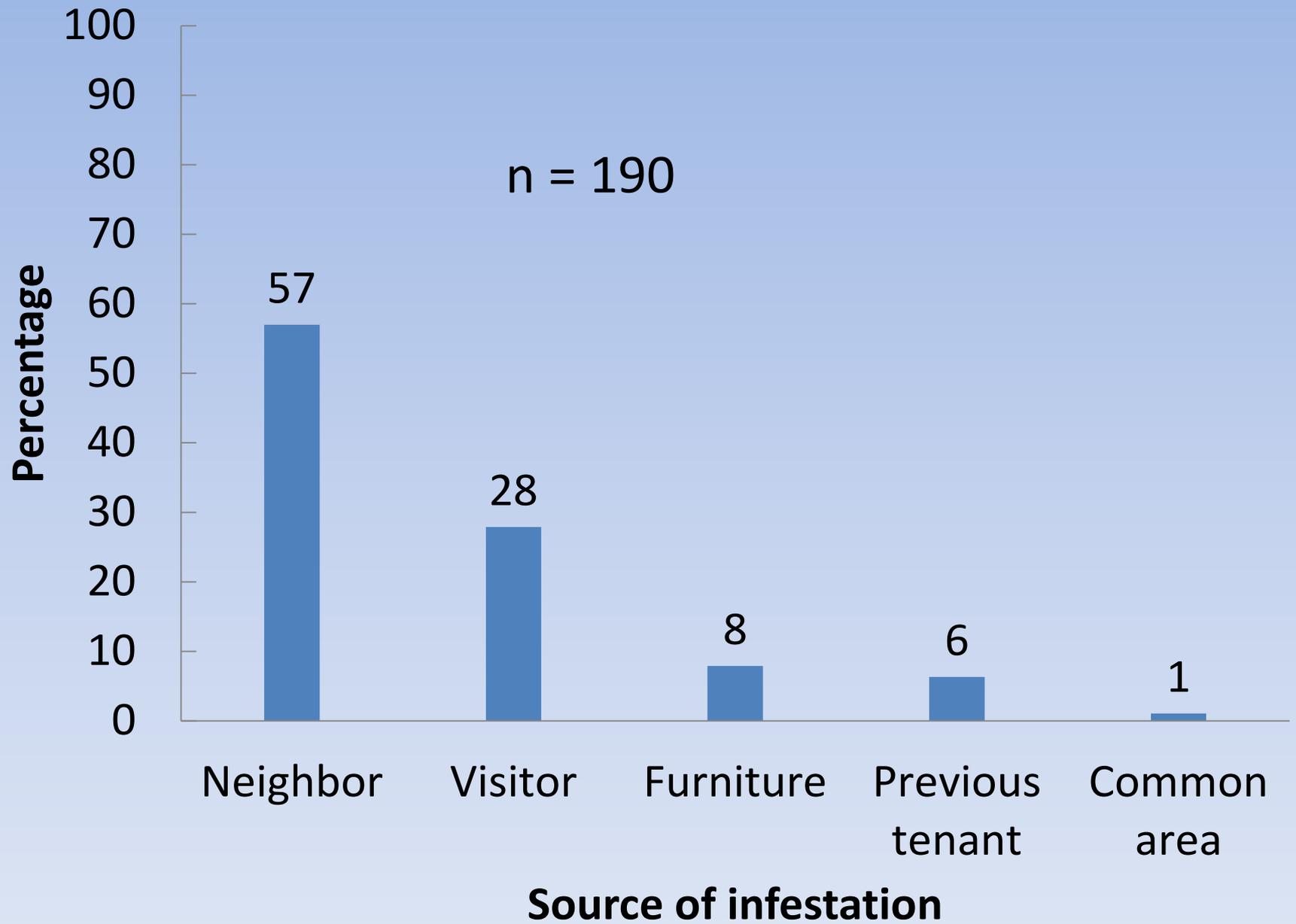
Bed Bug Survey in New Jersey, 2014



2,372 low-income apartments

Survey Results

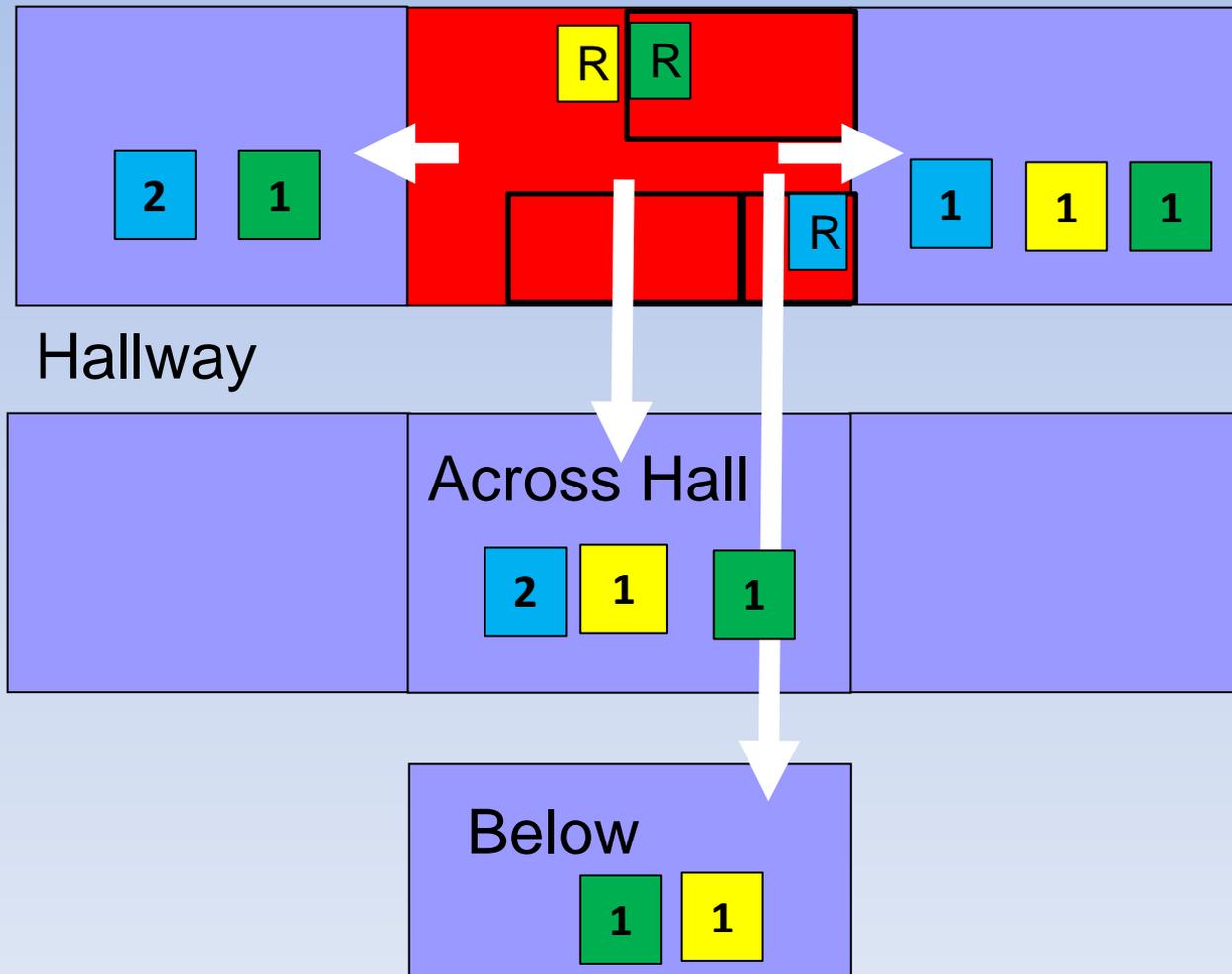
- 26% experienced bed bug infestations
- 12% had existing bed bug infestations
- Only 47% of the residents were aware of bed bugs while being infested
- Management offices were aware of < 33% of the infestations



Mark-Release-Recapture Study



14 Days after Release of 477 Bed Bugs



Results

- Six mark-release-recapture apartments
- After 14 days, dispersal rate was 0-5%

Why Bed Bugs are Common in Low-income Housing?

- Low quality pest control service
- Ineffective treatment
 - Relying on sprays instead of IPM
 - cursory treatment
 - Lack of follow-up service
- Lack of resident cooperation
 - Clutter, infrequent laundering

Chemical Treatment

- Insecticide resistance
- Health concern





10 gallons in a one bedroom apartment within 12 months

Foggers



Jones and Bryant. 2012. *J. Econ. Entomol.* 105: 957-963

Effective Bed Bug Management Tools and Methods

1. Place Items in Plastic Containers



2. Mattress Encasements



3. Frequent Laundering and Hot Drying



Potter et al. 2007. *Pest Control Technol.* 35: 24–32.

Naylor and Boase 2010. *J. Econ. Entomol.* 103: 136–139.

4. Steam



The steamax: ~\$700

HAAH handheld steamer: ~\$70



5. Containerized Heat Treatment



ThermalStrike: ~\$180



Operation time: 4-8 hours

6. Freezing



A minimum of 3.5 days in a household freezer
(-17.8°C or 0°F)

Olsen et al. 2013. *J. Econ. Entomol.* 106: 2433-2441

Integrated Pest Management (IPM)

- Use a combination of different methods
- Monitor the bed bug population frequently to evaluate the treatment effectiveness
- Re-treat until no bed bugs are found
- Conduct community-wide treatment in multi-unit dwellings

Bed Bug Monitoring Tools and Methods

- Visual inspection + interceptors
- An average 6.2 minutes per apartment including down time between apartments
- Can be done easily by a housing staff



ClimbUp insect interceptor

Accuracy of Monitoring Methods

- Climbup interceptors alone – 89%
- Visual inspection alone – 72%
- Compared with canine detection, using visual inspection + monitors is much more economical and accurate



Wang et al. unpublished data

A Model Bed Bug IPM Program

- Study site: Jersey city, NJ.
 - 4 buildings, 358 units



IPM Program Components

- Educating residents and staff
 - On site seminars
 - Bed bug brochure to each resident



- Demonstration



- Pro-active inspections
 - 0, 6, and 12 month building-wide inspections





Initial Treatment





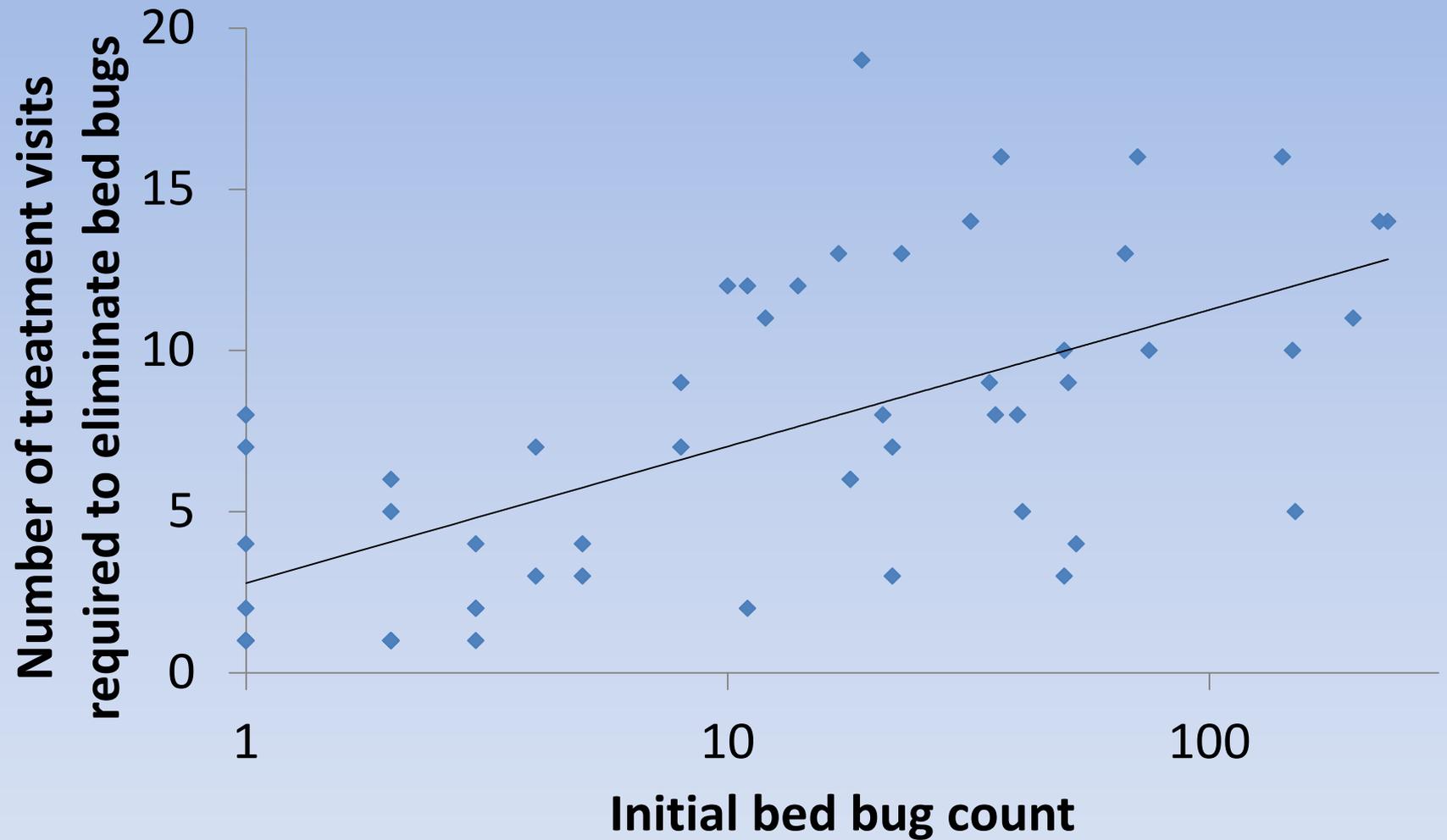
DE dust & spray

Follow-up Inspections and Treatments

- Inspect and clean interceptors, conduct visual inspection every two weeks
- If bed bugs found
 - Bag clothing and linens for washing
 - Hand remove bed bugs
 - Apply steam, aerosol, or liquid spray only when > 5 bed bugs are still present
- Stop after no bed bugs were found during **three consecutive visits**

Results

| Period | Number of apts with bed bugs | Infestation rate |
|----------|------------------------------|------------------|
| Initial | 55 | 15% |
| 6 month | 10 | 2.8% |
| 12 month | 8 | 2.2% |



Mean number of visits to eliminate an infestation: 7

Overcoming Obstacles

- Bag linens and provide laundry tokens
- Reduce clutter
- Provide a heat box for treating non-washable items
- One apartment was still infested after 22 visits

Keys for Successful Bed Bug Management

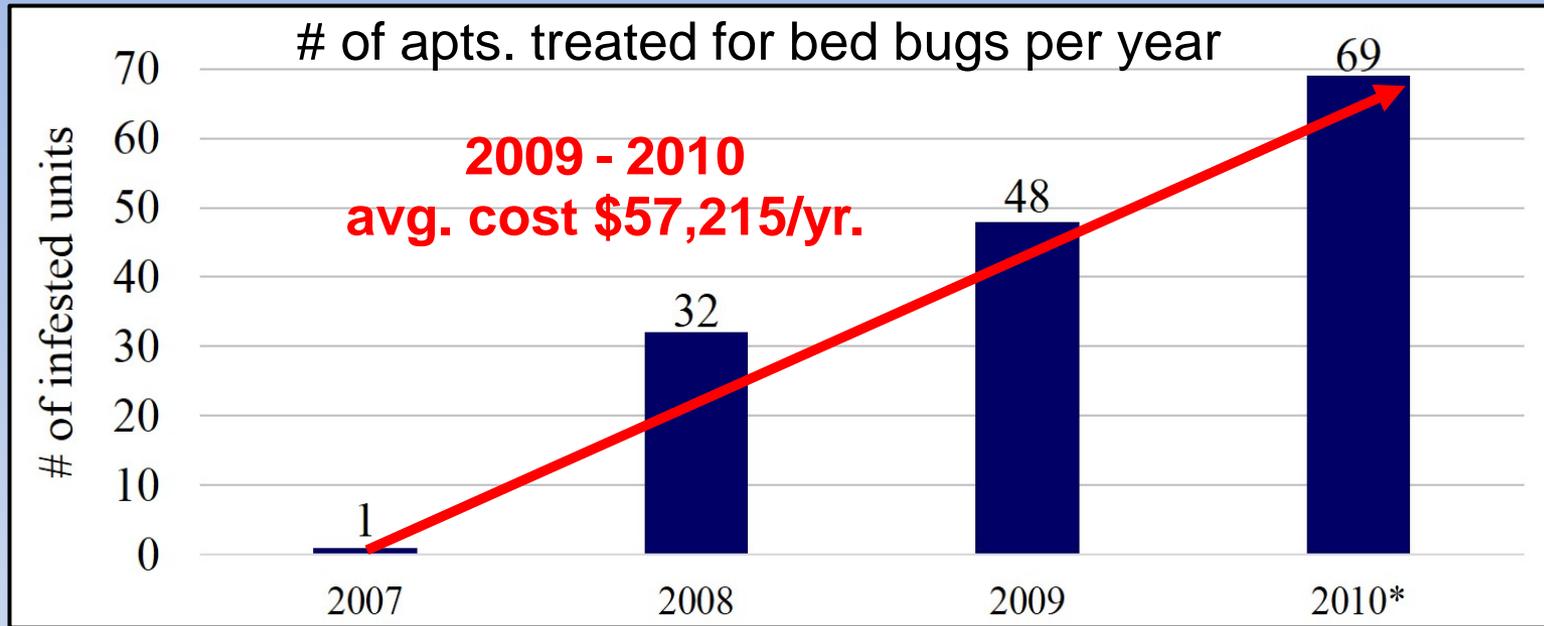
- Good bed bug control strategies
 - Using a combination of non-chemical and chemical tools and methods
 - After initial treatment, conduct bi-weekly monitoring and treatments
 - Do not leave problem units infested. Provide extra assistance to residents who cannot or do not follow instructions.
 - If >5% of apartments are infested in a building, conduct periodic building-wide inspections

Keys for Successful Bed Bug Management (continued)

- Good bed bug management policy
 - A good bed bug contract
 - Trained staff to inspect bed bugs, provide bed bug treatment assistance, and monitor the bed bug control quality

Using Research to Create Better Bed Bug Contracts

JCHA Study Revisited



Why did it fail?

- Reactionary approach
- Inconsistent treatment methods
- Inconsistent follow-up protocol
- No method for determining if bed bugs eliminated

The Rutgers JCHA Study Was a Success

Reduced the infestation rate from 15% to 2%
within 12 months

What did it cost?

< \$7,000 more than previously spent

How did we do it?

1. Proactive inspections
2. Effective treatment methods
3. Consistent follow-up visits
4. Elimination protocol
5. Housing staff assisted residents when necessary

Most Bed Bug Contracts are Reactive

Typical contract language

“Once a complaint has been made to the Authority the contractor will inspect the unit to verify an infestation.”

Residents are often unaware they have bed bugs

- 78% of infestations were not reported to property management
- 90% of residents were unaware of bed bugs at the time we detected the activity

What's Happening at Housing Authorities?

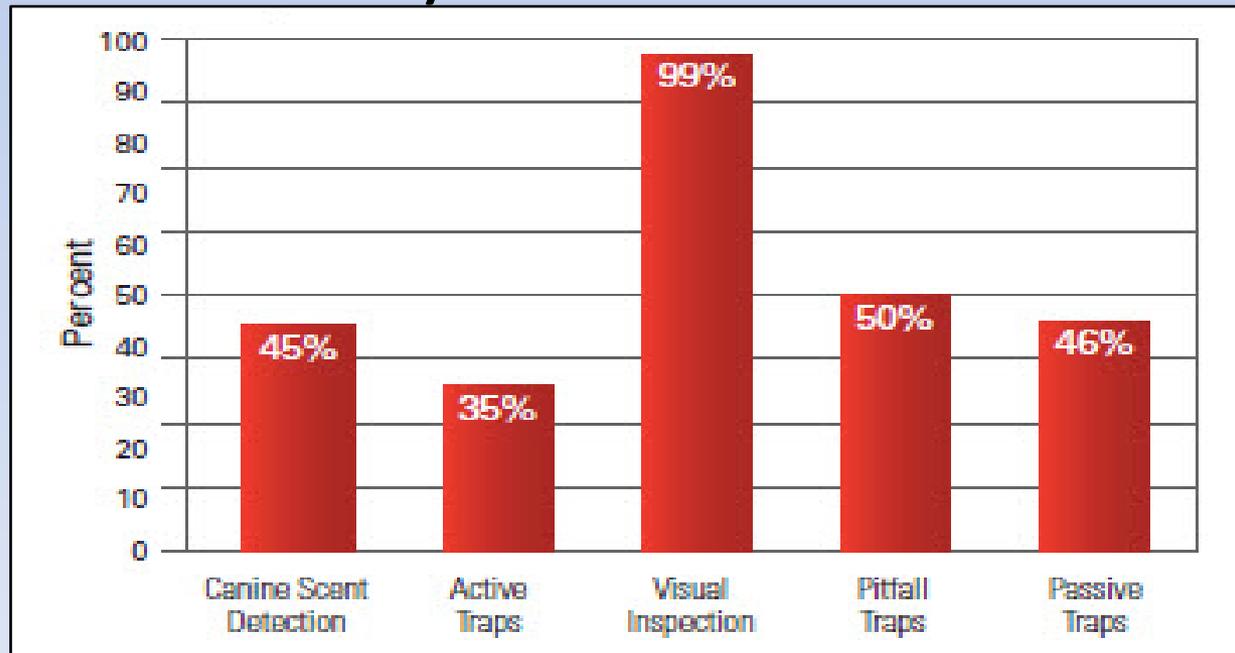
2012' survey of 26 housing communities

- 77% housing authorities either reacted to complaints or had an inadequate pro-active inspection program

Contracts Don't Specify Inspection Methods to be Used

- Visual inspection miss 25-50% of infestations
- Interceptors detect $\geq 90\%$ of infestations

Methods used by PMPs to detect bed bugs



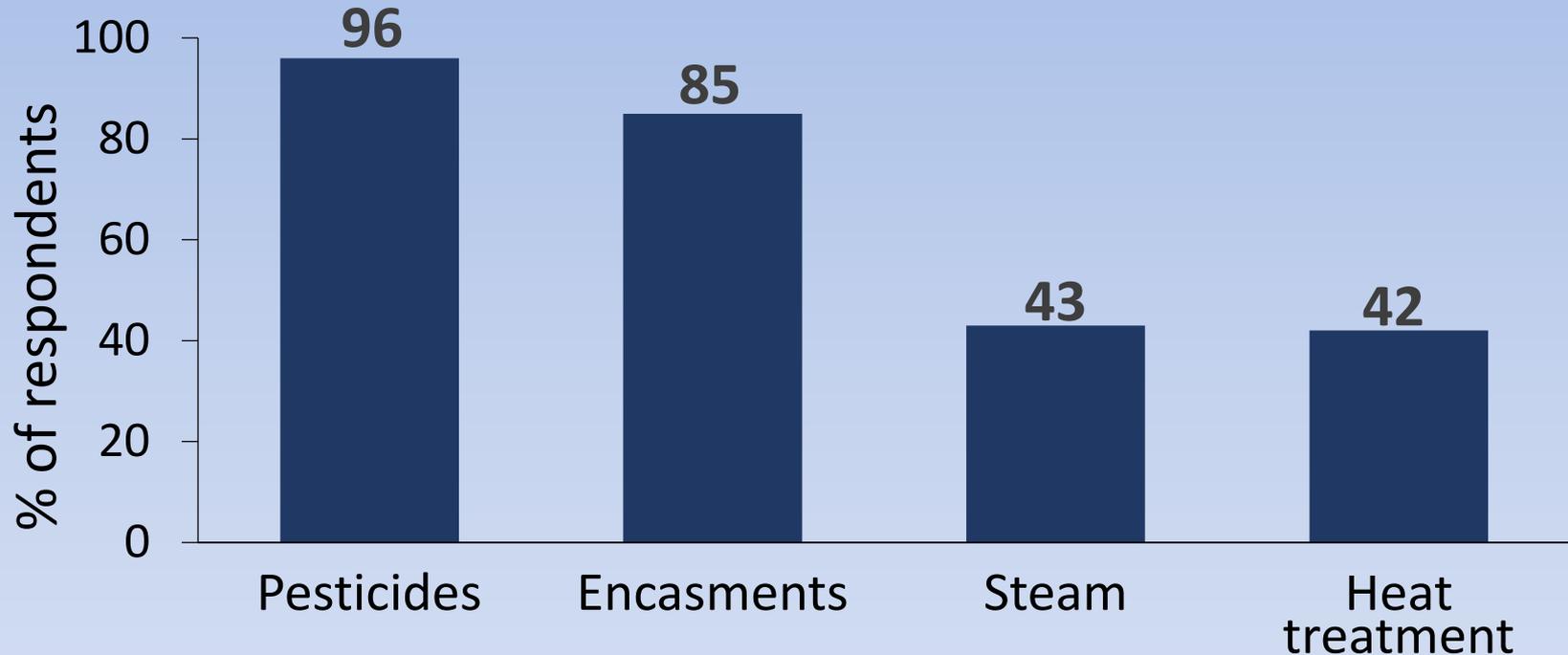
What's Happening at Housing Authorities?



65% of Housing Authorities surveyed rely upon visual inspection for detection of bed bugs

Treatment Methods

Potter et al. (2013)



Wong et al. (2013)

55% of housing authorities rely on pesticides alone

How Many Visits Are Needed?

The number of treatments should not be pre-determined

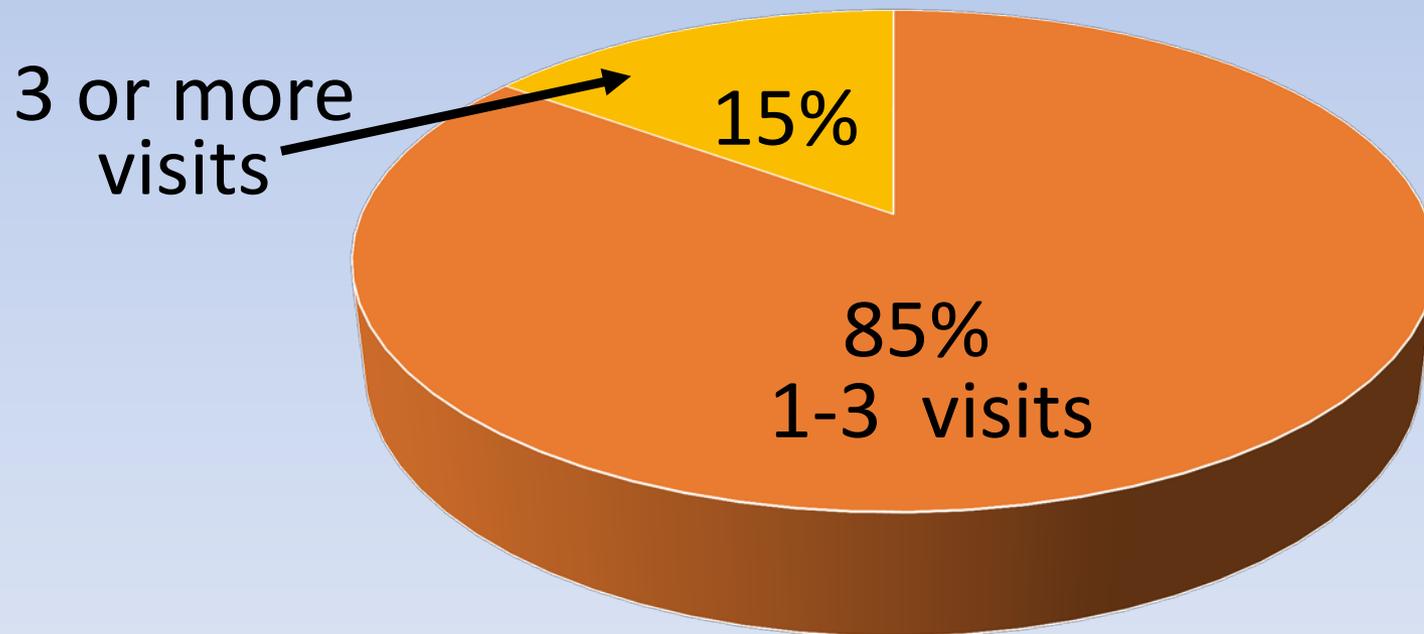
Contract language varies widely

- “Bed bug treatment process must have two treatments (14 days apart) to each unit”
- “Each unit shall be treated three times plus a follow up treatment if needed”
- “Each unit will receive an initial treatment plus five follow up visits”

How Many Visits Are Needed?

2013 survey of PMPs

“How many visits to ‘control’ infestations?”



The Number of Visits Needed to Eliminate Bed Bugs Varies Greatly

JCHA study:

Avg. of 7 visits were required to eliminate infestations

- 55 existing infestations = 8.2 visits
- 11 new infestations = 2.1 visits

How Do We Determine Elimination?

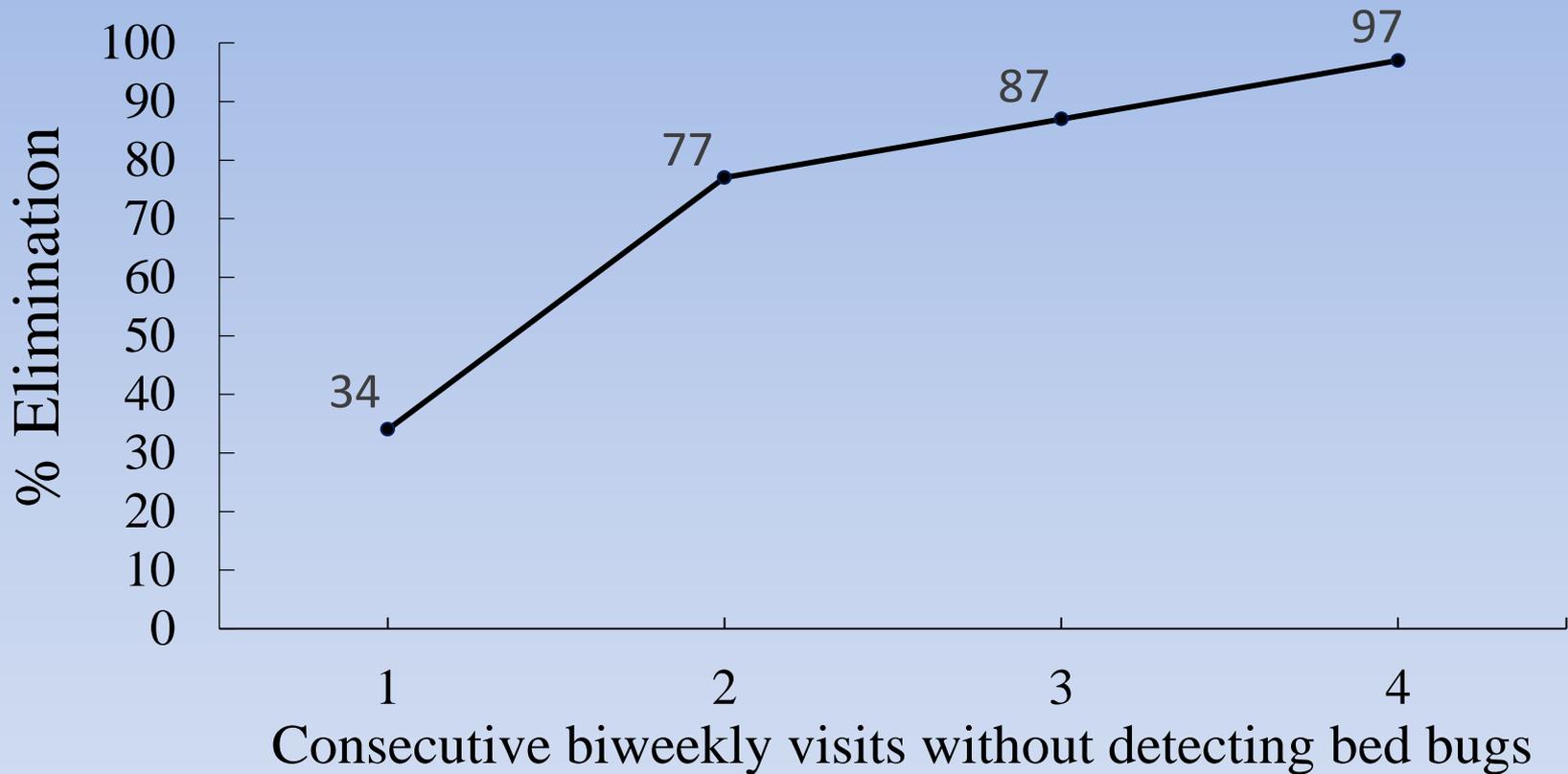
Most PMPs rely on visual inspection alone

Rutgers study:

Monitored 64 apartments after treatment effort terminated (interceptors at beds/sofas plus visual)

- Activity detected in 41/64 (64%) of apartments
- 54% of the time bugs only detected away from sleeping areas
- Activity was not detected during every trapping interval

Determining Elimination



Three consecutive visits (6 weeks) with no activity provides 87% confidence that the infestation has been eliminated

How Can Contracts be Changed to
Rein in the Spread of Bed Bugs in
Affordable Housing?

Contracts

Treatment strategies should be backed by science

Examples of poor bed bug contracts:

- “The primary agent to be used for treatment is a concentrated, non-bacterial, readily biodegradable enzymatic solution....”
- “All infested units will be treated using a liquid residual insecticide labeled for bed bugs”

Recommend IPM approach

1. Encasements, vacuuming, steam, etc.
2. Install interceptors and inspect them biweekly
3. Use effective pesticides as last line of defense

Contracts

Build accountability into contract language to ensure elimination of infestations

Example:

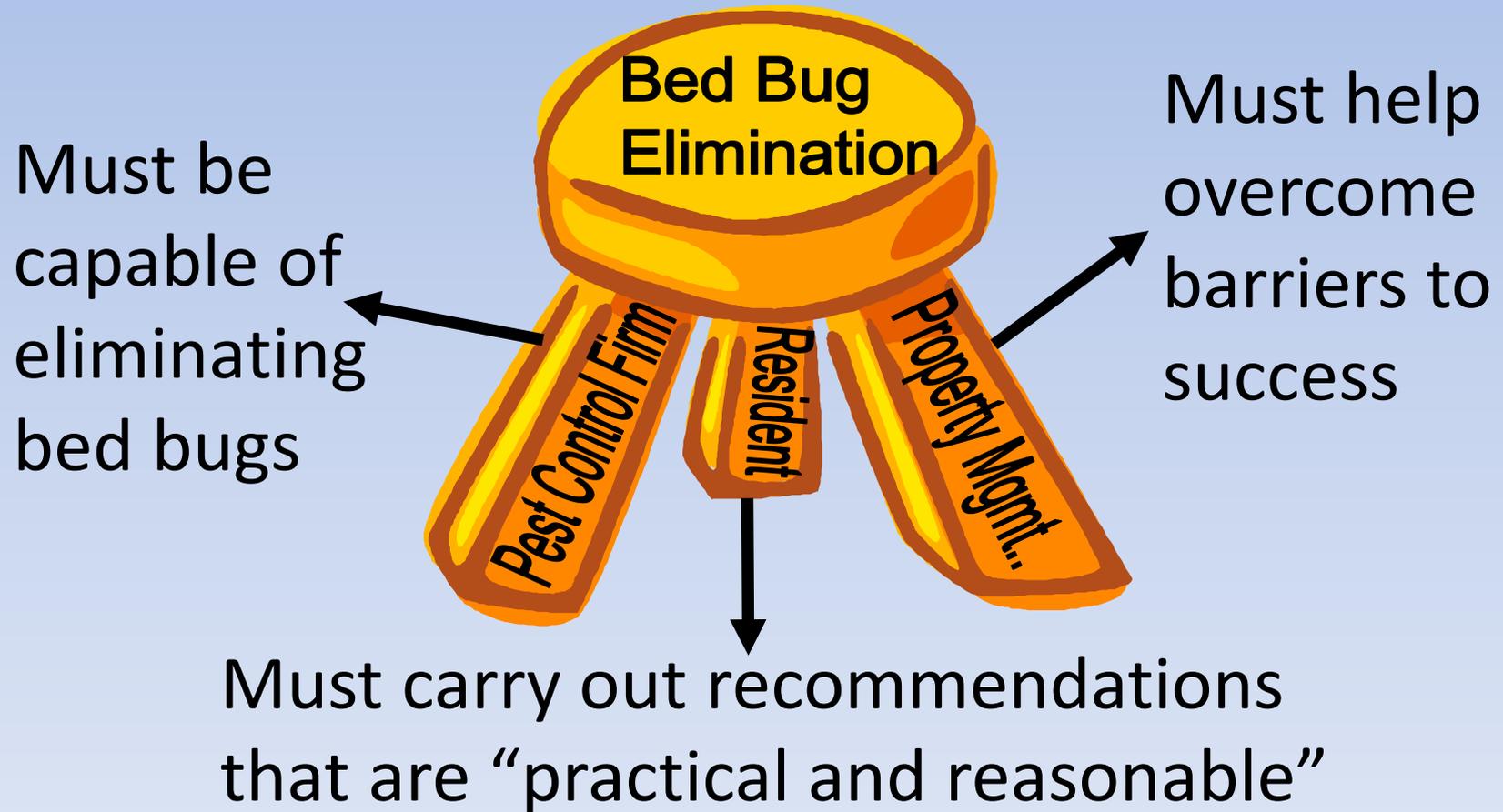
1. Install interceptors at and away from furniture
2. Follow up ~ every 14 days until no bed bugs in interceptors or visual inspection for 2 consecutive visits
3. QA inspection by housing staff within the next 14 days to confirm elimination
4. If not eliminated, apartments go back into treatment program

Include the Role Property Management in Contract

Assisting residents

- Laundering linens or infested clothing
- De-infesting personal items (portable heat boxes)
- Reducing clutter (especially around sleeping areas)

Elimination of infestations requires a cooperative effort!



Summary of a Good Contract

1. Request price for proactive inspections
2. Use both monitors and visual inspection
3. Cost for treatments should be based upon type of unit
4. Treatment should be based on IPM, not pesticides alone
5. Exhaustive preparation requirements should be prohibited
6. Methods of determining elimination should be built into the contract

Questions?