Best practices for healthy child care centers

Integrated Pest Management

Guidance for keeping your child care center pest-free and healthy

Division of Epidemiology, Environmental and Occupational Health
Consumer, Environmental and Occupational Health Service
Environmental and Occupational Health Surveillance Program
http://www.nj.gov/health/ceohs/environmental-occupational/hazardous-waste-sites/index.shtml

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Introduction

This manual was developed by the New Jersey Department of Health (NJDOH) to be used as guidance for New Jersey child care center operators to control pests using Integrated Pest Management (IPM). This guidance outlines a common-sense approach that is protective of human health, affordable, and environmentally friendly.

Types of Pests

This guidance document serves as a resource manual to educate operators on the different types of pests and how to approach controlling them in a comprehensive way. The manual includes descriptions of pests commonly found at child care centers as it is critical to understand pests and their behaviors to effectively control them.

Reducing Exposures to Hazardous Substances

While many child care center operators hire outside contractors to manage indoor and outdoor pest problems, there are many measures operators can do themselves to prevent infestations. The primary goal of this manual to reduce unnecessary exposures to chemical pesticides. The overuse of pesticides can be harmful to the health of children and staff and can also kill beneficial organisms that can help control pests and may make pests more resistant to pesticides.

An effective IPM program reduces unnecessary pesticide applications while eliminating pests that may carry vector allergens or disease. In addition to reducing unnecessary exposures to chemicals, IPM reduces costs and potential pest damage.

This manual is based on the New Jersey Department of Environmental Protection (NJDEP) School IPM manual [NJDEP 2006] and the United States Environmental Protection Agency (USEPA) [USEPA 2018].

This work was supported by funding from the Agency for Toxic Substances and Disease Registry (ATSDR) under Cooperative Agreement NU61TS000288-01-00.

NOTE: Child care centers located in schools are covered under the school's IPM program. All New Jersey schools are required to implement an IPM program per the New Jersey School Integrated Pest Management (IPM) Act, a state law that became effective for schools in June 2004.

Information on the New Jersey School IPM law is available on the New Jersey Department of Environmental Protection (NJDEP)'s Internet website at: http://www.nj.gov/dep/enforcement/pcp/ipm-laws.htm.

SECTION 1. Integrated Pest Management

What is Integrated Pest Management?

Integrated Pest Management (IPM) is a holistic approach to controlling pests using a variety of tools including sanitation and other preventative management techniques rather than automatically turning to chemical controls as a first option. Examples of these techniques include removing sources of food, water and shelter for pests and physically blocking pest entry into buildings. Pesticide use is an important tool in the pest control "toolbox" but an effective IPM program can greatly reduce reliance on chemical controls.

In a typical IPM program, important information about a pest is combined with careful selection of common-sense methods to:

1) **Prevent**: Eliminate the sources of pest infestations.
2) **Manage**: Affordably control pests while ensuring the lowest possible hazard to people and the environment.

The legal definition for Integrated Pest Management from NJ State regulations, N.J.A.C. 7:30-1.2:

Integrated pest management, or IPM, means a sustainable approach to managing pests by using all appropriate technology and management practices in a way that minimizes health, environmental and economic risks. IPM includes, but is not limited to, monitoring pest populations, consumer education, and when needed, cultivation practices, sanitation, solid waste management, structural maintenance, physical, mechanical, biological and chemical controls.

Why is IPM important for child care centers?

Infants and young children are among the most likely groups to suffer long-term health effects from exposure to chemical pesticides. Early exposure to pesticides can disrupt and permanently change the structure and function of organs and body systems.

Young children are especially vulnerable to pesticide exposure because they:

- ✓ **Spend time on the floor where pesticide residues are more likely to be present**
- ✓ **Pick up toys and other objects off the floor and put objects and fingers into their mouths**
- ✓ **Can get into small spaces where they can touch cracks, crevices, and holes where pesticides may have been applied**

According to the U.S. Environmental Protection Agency (EPA), overexposure to pesticides can cause health problems [EPA 2009].

Long term exposures may cause:

- Birth defects
- Learning disabilities
- Behavior changes
- Organ damage
- Cancer (including leukemia, breast, and brain)
- Asthma

Short-term exposures to high levels may cause:

- Headaches
- Dizziness
- Muscle twitching
- Weakness
- Tingling sensations
- Nausea

What are the benefits of using IPM in child care centers?

- More effective by addressing the cause of pest problems by removing what attracts pests and deny access.
- Healthier learning environment for children.
- Better long-term control of pests.
- Reduce liability of the facility.
- Lower costs to the child care center operator.
- Promote cooperation between staff.
- Customer satisfaction that help your business grow.

How to start an IPM program in your child care center?

IPM begins with learning how to prevent indoor and outdoor pests from becoming established. If your child care center has a pest control professional under contract, regular communication with them is important. That contractor should also be knowledgeable in IPM. Be sure your pest control company has resources, such as an entomologist on staff or available to them.

Pest problems can often be prevented simply by denying them food, shelter, or water, which pests need to survive and reproduce. Successful pest control may be as simple as blocking the pest's access into buildings or paying extra attention to sanitation and maintenance.

Child care centers should be kept clean, uncluttered, and in good repair. This ensures a healthy indoor environment, reduces maintenance costs and conserves energy. This will also help reduce the number of pests and prevent them from becoming a problem. IPM can be a cost-effective way to provide a safe and healthy environment for children and staff in child care centers.

If you are going to hire a Pest Management Professional:

- ✓ Confirm they have a current and valid license with the NJDEP.
- ✓ Confirm they have taken Category 13* Training (which is IPM in schools).
- ✓ Confirm that they offer an IPM solution to the problem.

*Category 13 ensures that applicators clearly understand the importance of using non-chemical methods as a first choice in schools and similar facilities.

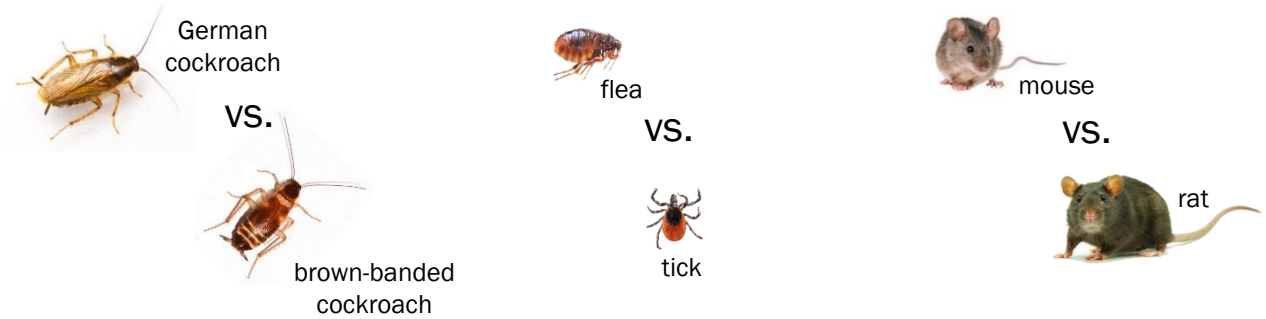
The 5 Components of an IPM program

1

Inspection includes determining potential pest entry locations; pest sightings; identifying sources of food, water, and harborage (shelter); and looking for signs that pests are present. Examples include rodent droppings, feeding damage, and cast skins of insects.

2

Identification involves confirming the type or species of a pest (for example, a mouse versus a rat; a German cockroach versus a brown-banded cockroach). Once the pest is identified, habitat modifications may greatly reduce the infestation. These habitat modifications may include making repairs, cleaning, removing standing water, and removing clutter.



3

Monitoring is the ongoing assessment of pest infestation. Information gained through active monitoring is evaluated to determine whether control measures are required, and when they should take place.

4

Action Thresholds define the point above which specific pests cannot be tolerated, triggering a pest-specific treatment action. Action thresholds may be based on different criteria. These criteria may include a) quantity of pests observed, b) health problems associated with pests, c) pest damage to buildings or food resulting in financial loss.

The presence of one or a few pests does not necessarily require application of pesticides or other pest control actions. However, when pest populations exceed action thresholds, action should be taken.

5

Education refers to changing people's behaviors, particularly how they dispose of wastes and how they store food. Child care staff and children, as well as parents, should be aware of the IPM program and the important roles they play to make the program work.

Team IPM

Examples of how staff and children are involved in IPM include:

- Reporting broken doors, leaky pipes and faucets, cracks in walls or windows,
- Picking up clutter in classrooms,

- Not leaving food, crumbs, or other items around that may attract pests,
- Storing food in locked plastic containers,
- Reporting/cleaning up food, water, and drink spills
- Reporting pest sightings

What's the Bottom Line with IPM?

- IPM is a way to think and make informed decisions.
- IPM requires you to understand the behaviors of the pests you are treating.
- IPM is a commitment to using safer, low-impact pest control methods to keep child care centers pest free.
- IPM is about people working together for the common goal of safer environments for our children.

SECTION 2. Pest Treatment Options

Many methods are available to treat pest problems. The methods described below include habitat modification, physical and mechanical controls, biological controls, and chemical controls. Selection of an appropriate treatment involves choosing from available options using appropriate criteria, which may include doing nothing at all. If more than one control method is selected, they should complement each other.

Habitat Modification

Pests need food, water and harborage (shelter) to survive. Eliminating or reducing these resources provides an environment that supports fewer pests and controls their populations.

Examples include:

- practicing good sanitation to reduce food available for rodents, flies, yellowjackets, ants, and cockroaches;
- repairing leaks and keeping surfaces dry overnight to reduce water available to pests;
- removing clutter and caulking cracks and crevices to eliminate cockroach and flea harborage;
- sealing food tightly in pest-proof containers to prevent access to food.

Cardboard boxes provide shelter for rodents and cockroaches. Therefore, when shipments are received in cardboard boxes, the boxes should be inspected upon arrival for pests, unpacked, and promptly disposed for recycling. No items should be stored in cardboard boxes or directly on the floor. Items should be stored on wire shelves at least six inches above the floor to allow for easy cleaning.

Cracks and crevices in walls, floors or along the building foundation should be repaired. Pipe chases throughout the building should be blocked and sealed to prevent pests from finding shelter in places such as behind or within walls.

Physical and Mechanical Controls

Traps are common mechanical control methods, and they are available for a variety of pests, especially rodents, wasps, and cockroaches. Barriers such as window screens are simple but effective controls. A heavy-duty vacuum can be used to remove cockroaches, spiders, and many temporary invading insects. A fly swatter, or even a jar may also be the simplest and most effective control for occasional pests.

Biological Controls

Biological controls involve the use of a natural enemy or predator to control pests. Some natural enemies can be purchased for controlling pest insects on indoor or outdoor ornamental plants. Avoiding the use of broad-spectrum insecticides (which kill a wide range of pests) helps conserve beneficial insects such as ladybugs and lacewings.

Chemical Controls

Many pesticides are available for use against various types of pests. Pesticides include:

- insect poisons (insecticides)
- rat and mouse poisons (rodenticides)
- disinfectants, mold and mildew products
- products that control plant disease (fungicides).

The health of children and staff and the long-term suppression of pests are the primary objectives of an IPM program. To accomplish these objectives, non-chemical alternatives should be considered first. When non-chemical methods are unavailable or ineffective, pesticide use, often in combination with non-chemical methods, is justified. This approach will reduce the need for pesticides and will maximize their effectiveness when they are used.

Moth balls (or moth flakes, crystals, or cakes)

- Moth balls are pesticides and are regulated by the U.S. Environmental Protection Agency.
- Moth balls are only meant to be used to control clothing moths and other clothing insect pests. It is illegal to use moth balls as repellents for other insects and animals, such as cockroaches, fleas, mice, squirrels, raccoons, or snakes.
- Moth balls are dangerous because they can be mistaken for candy or food and eaten by children or pets.
- Moth balls contain either naphthalene or 1,4 dichlorobenzene which can cause harmful health effects if ingested or inhaled.

SECTION 3. Guidance On "Low Impact" Pesticides

When pesticide use is necessary, the following are key points to remember:

1. **Select products carefully and use low impact pesticides**
2. **Minimize the risks of pesticide exposure to building occupants**
3. **Communicate with a pest control professional about using IPM**
4. **NEVER apply pesticides as routine or "preventive treatments" in or around a child care facility**

Low Impact Products

If non-chemical means of pest control have been unsuccessful and chemical pesticides must be used, preference should be given to "low impact" pesticides. Low impact pesticides have a lower risk of harmful health effects than typical pesticide products. All pesticides have some degree of risk associated with them, including those that are considered "low impact."

Application of Low Impact Products

Actual risk reduction from pesticide use can only be achieved by applying low impact products appropriately. The timing, method and location of the pesticide application is critical.

For pesticide selection to truly reduce risk in an IPM program (whether or not it is classified as low impact), the following questions should be considered:

- What is the pesticide being used for?
- When will it be used?
- Where is it going to be applied?
- What methods will be used to apply the pesticide?
- What organisms will it potentially affect other than the target organism?
- After application of this pesticide, will it drift or be carried around?

NOTE: Tracking powder used to kill rats and mice is a restricted-use pesticide for use only by certified applicators and can only be placed in locations that are not accessible to people and pets.

The New Jersey Pesticide Control Code (N.J.A.C. 7:30) has defined low-impact pesticides which can be applied to child care centers. These low-impact pesticides fall under the following two categories:

1. Pesticides or substances that the EPA has decided are not necessary to regulate, generally because of the minimal risk they represent.
2. Pesticide ingredients or formulation types that are considered to be of lesser risk because of the nature of the product formulation, the ingredient, or how it is used.

If pesticides are needed, consult with a pest control professional to determine if any of these pesticides will adequately solve the problem.

EPA-exempt pesticides or substances

Pesticides and substances that are not regulated by EPA are as follows:

A) Active ingredients found in "low impact" pesticides

The table below provides a list of "active" ingredients that are found in low impact pesticides and are exempt from EPA regulation. However, under New Jersey law, these active ingredients are considered "minimum risk" and thus are able to be used as a low impact pesticide only if the following conditions are met:

- ✓ The product is properly labeled with all ingredients (both active and "inert"),
- ✓ The product does not claim to control disease carrying pests, and
- ✓ The product does not make false or misleading claims

List of active ingredients found in "low impact" pesticides		
• Castor oil	• Garlic and garlic oil	• Putrescent whole egg solids
• Cedar oil	• Geraniol	• Rosemary and rosemary oil
• Cinnamon and cinnamon oil	• Geranium oil	• Sesame (includes ground sesame plant stalks) and sesame oil
• Citric acid	• Lauryl sulfate	• Sodium chloride (common salt)
• Citronella and citronella oil	• Lemongrass oil	• Sodium lauryl sulfate
• Cloves and clove oil	• Linseed oil	• Soybean oil
• Corn gluten meal	• Malic acid	• Thyme and thyme oil
• Corn oil	• Mint and mint oil	• White pepper
• Cottonseed oil	• Peppermint and peppermint oil	• Zinc metal strips (consisting solely of zinc metal and impurities)
• Dried blood	• 2-Phenethyl propionate	
• Eugenol	• Potassium sorbate	

The active ingredients listed here may be combined with any of a number of "inert" ingredients from a list published by EPA. This list of minimum risk inert ingredients is known as List "4A". The "4A" list changes periodically and is re-published by EPA after changes are made. Updates of list 4A can be obtained from EPA's Internet website at www.epa.gov/opprd001/inerts/inerts_list4.pdf.

B) Other EPA-exempt pesticides and substances:

- Treated articles or substances, for instance, wood treated with EPA-approved insecticide and labeled for consumer use.
- Pheromones or pheromone traps, substances produced by insects that can be used to lure or trap insect pests of the same species.
- Preservatives, for biological specimens, such as embalming fluids, when used for that purpose.
- Food or food products used to attract pests.
- Cedar wood; blocks, shavings, chips, etc., used to repel insects.

NOTE: Some child care centers may have playsets built with wood treated with chromated copper arsenate (CCA). This chemical is hazardous. CCA-treated wood is primarily available for industrial use and not meant for use in child care centers. It was used on wooden playsets until 2004. If you suspect your center's playset contains CCA-treated wood, consider replacing it with a safer alternative.

Other pesticides that the NJ Pesticide Control Code considers "low impact"

The following ingredients or types of pesticides are also considered low impact:

Formulation Types – gels, pastes, or baits. Ant traps and insecticide gels are good examples of this class of low-impact pesticides. Some rodent baits may be used; however, be sure to follow the manufacturer's instructions to prevent children from coming into contact with the product.

Antimicrobial Products – pesticides used to kill microorganisms such as bacteria and fungus. Disinfectants, cleaners, mold and mildew removers all fall into this classification

Specific Active Ingredients – the following are specific pesticide ingredients that the NJ School IPM law has designated as "low impact":

- boric acid
- disodium octaborate tetrahydrate
- silica gel
- diatomaceous earth

Microbe-Based Insecticides – the most common example of this would be *Bacillus thuringiensis* or "Bt," a widely used microbe that is the ingredient in many home and garden products, mosquito larvicides, and gypsy moth control products.

Botanical Insecticides (not synthetic) – a common example of this would be *Pyrethrum*, extracted from the *Chrysanthemum* plant, or neem oil which is extracted from kernels of the neem plant. Synthetic versions of botanicals (pyrethrin) or those that contain "toxic" synergists to enhance the potency do not qualify as low impact. **So, a product with *Pyrethrum* is low impact while a product with pyrethrin is not low impact.**

Biological, Living Control Agents – a common example of this would be a pesticide that uses parasitic nematodes (a small worm-like organism) as its active ingredient. These nematodes are used to control a wide variety of insects. Beneficial insects would be another type of control agent that would fit into this category. For more information about beneficial insects, see the New Jersey Department of Agriculture's Internet website at www.nj.gov/agriculture/plant/pabil.

NOTE: Questions about whether a pesticide qualifies as low impact should be directed to the New Jersey Department of Environmental Protection (NJDEP)'s Pesticide Control Program at (609) 984-6568.

SECTION 4. Using IPM to Control Pests Commonly Found in Child Care Centers

Part A. Insect Pests

1) Ants

Ants become pests when they invade buildings in search of food or shelter. It is often very difficult to eliminate most ants from their outside habitat, so management efforts should aim at preventing ants from invading structures. Unfortunately, prevention is not always successful and management actions must be implemented.

The first step in managing pest ants is proper identification, since many types of ants may invade a structure. It is critical to identify the type of ant you want to manage, because most ants differ in their habits and food preferences.

Ants walk over many kinds of surfaces and sometimes feed on dead animals and insects, so it is possible that they can carry disease-causing organisms to human food. Assume that ant-infested food has been exposed to organisms that can cause spoilage, and throw it away.

Carpenter ants may cause some structural damage as they remove moist, rotting wood and other soft materials (such as foam board insulation) to make their nests. If you have carpenter ants, you have a moisture problem somewhere. Along with a pest control professional you will likely also need a carpenter and/or a plumber to correct the problem. Carpenter ants may signal a leaky roof or pipes, so repair any water leaks and replace moist or rotting wood as needed.

NOTE: Although ants often are regarded as pests, they are beneficial in several ways. Ants are predators of numerous pest insects, including fly larvae and termites. By aerating soil and recycling dead animal and vegetable material, they aid in the formation of topsoil. Ants are also responsible for pollinating plants in some areas. Ants provide a great service to the environment, and management efforts that prevent or suppress ants are preferred over practices that aim to eliminate ants.

Using IPM to Control Ants

If a trail of ants has been seen in your child care center, the area should be cleaned with soap/detergent and water to remove ant pheromone trails (a scent trail left for other ants to follow). It is also helpful to follow the trail to locate where the ants are harboring within the building.

Limiting Areas for Eating

If you expect to contain and limit pest problems, it is important to designate appropriate areas for eating, and to enforce rules about eating only in these areas. Having fewer designated eating areas makes it easier to limit pest populations.

Caulking

- Caulk all potential entryways with a silicone caulking compound.
- Use mildew-resistant caulk in moist areas.

- It is not practical to seal all cracks, but begin with the access point that the current trail of ants is using.
- Use weather strips around doors and windows where ants may enter.
- Repair any water leaks and replace moist or rotting wood as needed.

Sanitation

- Sanitation eliminates food for ants. Keep kitchens and food preparation areas clean.
- Sweep and mop floors.
- Drain all sinks and remove any food debris.
- If children regularly have snacks in classrooms, vacuum/mop those floors daily.
- Periodically give all food preparation areas a complete cleaning, focusing on areas where grease and food accumulate.
- At the end of each day, remove all garbage that contains food from the building.
- Use soapy water to wash any bottles, cans, wrappings, and other items that have food residues before storing them for recycling.
- If dishes cannot be washed right away, rinse them to remove food debris.
- Place garbage in sealed plastic bags, then place the bags into a rodent-proof dumpster or other storage receptacle.
- Keep garbage cans and dumpsters as clean as possible

Proper Food Storage

- Food not kept in the refrigerator should be kept in containers that close tightly.
- Do not use cardboard boxes to store food, they are not ant-proof.
- Keep sweet substances like sugar and honey in a refrigerator.
- Keep ants out of refrigerators using a light coating of petroleum jelly on the edge of the refrigerator seal.
- Use screw-top jars with a lid that has a rubber seal.
- Use glass containers with rubber gaskets or plastic containers with tight-fitting, snap-top lids.
- Don't store food in offices or classrooms.
- Storage shelves should be far enough off the floor to facilitate cleaning and to reduce ant access.
- No food supplies should be stored on the floor.

2) Cockroaches

Most roaches can survive about a month without food but will die within a few days without water. Cockroaches consume human foods and contaminate them with saliva and excrement. Their shed body shells contain allergens that may cause asthma and other bronchial problems in building occupants or even visitors. Cockroaches can also carry and transmit many common pathogens that cause human and animal diseases.

Cockroaches are generally active at night and remain hidden during the day. Daytime sightings usually indicate an infestation or that a cockroach has recently entered the building and is looking for a place to hide.

Using IPM to Control Cockroaches

Cockroaches need food, water, and shelter to survive, with shelter being the most important. By modifying the environment your child care center, you can reduce cockroach infestations.

Limiting Areas for Eating

If you expect to contain and limit pest problems, it is important to designate appropriate areas for eating, and to enforce rules about eating only in these areas. Having fewer designated eating areas makes it easier to limit pest populations.

Sanitation

Good sanitation is key in cockroach control. Keep kitchens and food preparation areas clean.

Proper Food Storage

- Food not kept in the refrigerator should be placed in a sealed container.
- Do not use cardboard boxes to store food, they are not roach-proof.
- Screw-top jars are cockroach-proof only if the lid has a rubber seal, because young cockroaches may be able to follow the spiral ridges to get into the jar.
- Glass containers with rubber gaskets or plastic containers with tight-fitting, snap-top lids are cockroach-proof.
- Remove food products from cardboard shipping containers before moving them into kitchens or storage areas.
- Transfer food packaged in cardboard or paper to plastic or glass containers as soon as the food arrives in the building.
- Do not bring shipping boxes into the food preparation area.
- Boxes should be broken down and stored away from the kitchen in a cool area until removed for recycling.
- Any food kept in offices or classrooms should be stored in ant and cockroach-proof containers.

Eliminating Water Sources

German cockroaches can survive for a couple of weeks without food but they must have regular access to moisture or they will die within a few days.

Cockroaches find drinking water in:

- Sink traps
- Appliance drip pans
- Drain pipes
- Wash basins and tubs
- Toilet bowls and flush tanks
- Spills
- Condensation (cold water pipes and windows)
- Leaky pipes and faucets
- Pet dishes and aquariums
- Vases
- Beverage bottles
- High-moisture foods
- Houseplant soil/overflow pans

Limiting cockroach access to water can easily be done by increasing sanitation and making repairs. Clean up spills and dispose of drink containers immediately after use. Keep aquariums and terrariums sealed with tight fitting screened lids. Repair leaks and dripping faucets, then drain or ventilate moist areas.

Kitchen surfaces should be kept dry when they are not in use, especially overnight. Place a small amount of detergent in toilet bowls, drains and traps, in bathrooms and kitchen areas at the end of the day to prevent cockroaches from drinking the water.

Eliminating Cracks and Crevices

- Start by caulking where cockroach populations are highest. If cockroaches remain a problem, caulk additional areas.
- Use silicon or mildew-resistant caulk around sinks, toilets, and drains.
- Before beginning the sealing process, vacuum and wash the area to eliminate egg cases, fecal material, and other debris.
- Caulk or paint over cracks around baseboards, wall shelves, cupboards, pipes, sinks, toilets, and similar furnishings.
- Install screens on drain covers in boiler rooms.
- Install weather-strips around doors and windows where cockroaches may enter.
- Keeping furniture and shelves about 1 inch from walls will help keep cockroaches from hiding behind them.

Eliminating Clutter

- Removing clutter from areas near prime cockroach habitats such as sinks, stoves, refrigerators, and vending machines is very important to managing cockroaches. Clutter in these areas increases available harborage near food and water.
- Any items that are no longer used or outdated should be removed from the premises. Storage of food products, cleaning supplies, paper and other goods should be kept to a minimum. Items should never be kept in corrugated cardboard boxes.
- Part of receiving a shipment should be to unpack boxes and properly store items, after properly disposing of the corrugated cardboard boxes.
- The best type of shelving for use in child care centers is metal shelving on wheels so that they can be moved for regular cleaning of storage areas.

3) Flies

Many species of flies can be problems in child care centers. This section discusses using IPM to control several types of flies. The section is comprised of two parts: the first part covers “filth” flies and other similar species, while the second is specific to fruit flies.

Each kind of fly has a distinct breeding site inside or outside the child care center building. To manage flies, you must find and reduce breeding sites, install and maintain screens to keep flies out of buildings, kill those flies that do get inside with a fly swatter or flypaper, and reduce or eliminate the odors that attract flies.

» "Filth" flies, cluster flies, phorid flies, and moth flies

House flies, dump flies, blue and green bottle flies, and others that breed in food wastes (garbage) and or animal feces are generally referred as "filth flies." Flies that invade kitchens and cafeterias are not just a nuisance, they also carry bacteria and other microbes that can contaminate food, utensils, and surfaces. The following table cover filth flies and other flies such as cluster flies, phorid flies, and moth flies that may be found in and around child care centers.

Type of fly	Description	Breeding site	Photo (not to scale)
House fly	House flies can be easily identified by the four dark, lengthwise stripes on top of the upper/middle body region. They cannot bite. These flies can only ingest liquid food. They feed on solid food by regurgitating saliva on it.	Food wastes (garbage) and/or animal feces	
Dump fly	A glossy black fly, the adult dump fly is similar in appearance to the adult house fly. They prefer dark locations and stay close to the ground.	Animal feces, decaying garbage, and other decaying organic matter	
Blow fly (blue and green bottle fly)	Blow flies are slightly larger than true house flies, and the bodies of many are metallic blue or green in color.	Food wastes, trashcans, spilled trash and animal feces	
Cluster fly	Cluster flies are larger and darker than house flies, and have a distinctive yellowish color.	Soil containing many earthworms is a common source of these flies	
Phorid fly	The most common phorid fly is small with a yellowish-brown body and light brown wings. The adults seem reluctant to fly, and they run around on walls, windows, and tables with a characteristic quick, jerky motion.	Phorid flies breed in diverse sources of organic matter, so it may take time and some detective work to find their breeding sites. Large infestations of these flies are often the result of broken drains or garbage disposals that allow organic matter to accumulate wall voids, under floors, in basements, or in the soil of crawl spaces.	
Moth fly (also called drain fly, pipe fly, sewer fly)	Moth flies are fuzzy, dark or grayish insects. Their body and wings are densely covered with hairs. Their wings appear too large for their body, and are held roof-like over the body when at rest, giving a moth-like appearance.	Sewage treatment plants and then be carried by wind to nearby buildings up to a mile away.	

Using IPM to Control "Filth" Flies, cluster flies, phorid flies, and moth flies

Modifying habitat is one of the most important aspects of fly management. It is impossible to manage filth flies without controlling wastes and odors.

Food Waste/Garbage Removal

- All food waste from the kitchen, cafeteria, and other areas should be separated from other garbage, drained so it will be as dry as possible, and then stored in sealed plastic bags before discarding.
- Place containers with small amounts of food waste, such as milk or yogurt cartons, into sealed plastic bags before disposal. This will reduce access by flies.
- Promptly fix drains or electric garbage disposal units that leak, or drains that allow food waste to accumulate under sinks or floors. Leaky drains can attract many species of flies.
- Remove any food waste that has accumulated under sinks or floors or in crawl spaces or basements at the site of the broken drain, and then clean the area thoroughly.
- In food preparation areas, rinse all cans, bottles, and plastic containers before recycling or discarding.

Exterior Garbage Cans and Dumpsters

- Inform children and staff about the importance of placing garbage inside the proper containers. Garbage should not be left lying on the ground.
- To avoid attracting flies into the building, place dumpsters and recycling containers upwind from the outside doors of the building. When dumpsters are downwind, flies are attracted to the waste odors and then find the odor trails that the breeze blows down from the doorways. Following these odor trails, they find their way into the building.
- Wastes should be collected and moved off-site at least once a week. Since flies breed faster in warm weather, garbage collection twice a week may significantly reduce fly problems.
- Make sure garbage can and dumpster lids seal tightly when closed and remain closed when not in use.
- Repair or replace garbage cans that have holes or lids that do not close tightly.
- Regularly clean garbage cans and dumpsters to prevent the buildup of food waste. Use a high-pressure stream of water or a brush and soapy water, if necessary. A solution of borax and water will eliminate odors.
- Do not allow soured milk to collect in trash receptacles; it is a powerful attractant to flies.
- If possible, dumpsters should be fitted with drains so they can be hosed or scrubbed out as needed.
- You may want to request that the refuse company clean the dumpster or replace it with a clean one more frequently. Some pest management companies will power-wash dumpster and dumpster areas as part of their service.
- Inspect dumpsters and other outdoor trash receptacles daily, and remove any wastes lying on the ground.
- Garbage cans should have removable domed tops with self-closing, spring-loaded swinging doors. Cans should be lined with plastic bags that can be tightly sealed and removed daily.
- If children do not have access to dumpsters, baits placed inside and residual insecticides on the outside of dumpsters work well.

Control Odors

Flies can detect odors across long distances. Smells of souring milk from hundreds of containers thrown in dumpsters can attract thousands of flies. Storing garbage in sealed plastic bags and having cans and dumpsters cleaned and emptied frequently to eliminate odors is very important. Removing pet feces also helps to reduce odors that attract flies.

Flies attracted to open kitchen or cafeteria doors, or to dumpsters or garbage, may rest on nearby walls, eaves, and rafters. While resting, they leave fly-specks, which have a strong fly-attracting odor. These brown-to cream colored specks should be washed off with an odor eliminating cleaner (a mild solution of borax and water can be particularly effective); otherwise, they will continue to attract flies.

Remove Animal Feces

Remove droppings promptly and put them into plastic bags that are sealed before disposal. Dog feces that dry quickly may attract adult flies with their odor, but are unlikely to host many maggots. Droppings that remain damp because of humidity or rain can breed maggots.

Install/Repair Screens

Install screens over windows, doors, and vent holes to prevent flies from entering buildings. Weather-stripping or silicone caulk can be used to ensure a tight fit. Torn screens can be repaired with clear silicone caulk.

Screen doors should be fitted with springs or automatic-closing devices that close the screen door firmly after it is opened. External doors that cannot be screened should be fitted with automatic closing devices, or vertical strips of overlapping plastic that allow human access but prevent fly entry.

Fly Swatters

In many instances, the old-fashioned fly swatter is the safest and quickest way to kill flies that have found their way into a room. Aim the fly swatter about 1.5 inches behind the fly, rather than directly at it. This is because research has shown that when a housefly takes off from a horizontal surface, it jumps upward and backward. Stiff plastic swatters seem to work better than wire-mesh ones. Flies are not able to see clearly beyond 18 inches, so the swatter can be moved to this distance before striking.

Flypaper

Sticky flypaper is effective at catching flies because it takes advantage of their natural habit of moving up to the ceiling to rest. It will take several days for a new strip of flypaper to start catching flies. Use a few strips at a time and replace them when they are covered with flies or when they begin to dry out. Flypaper can be very useful in areas where there are too many flies to kill with a fly swatter, and where aesthetic appeal is not of primary importance. Flypaper is also a useful monitoring tool. Do not place flypaper or sticky strips above or near food preparation areas.

Fly Traps

Fly traps can be used to reduce adult fly populations, capture specimens for identification, and monitor the effectiveness of management programs. Fly traps are not toxic and are more selective than using an insecticide. Traps need to be serviced regularly, placed appropriately and in discreet areas, and repaired or replaced when damaged.

» Fruit Flies

Fruit flies are small flies commonly seen flying around ripe fruit. These flies are most often a problem in late summer and early fall, so careful storage of fruit and vegetables is necessary at these times of the year.

Using IPM to control Fruit Flies

Fruit flies are most active from early summer through early fall. Problems with these flies can be avoided by ripening fruit and vegetables in paper bags. Seal the bags by folding the top over several times and closing them with paper clips or clothespins. Once fruit is ripe, store it in the refrigerator. Careful storage of fruit during the rest of the year may not be necessary.

If an infestation is discovered, look for and remove the fruit that is breeding the flies. Begin by searching for the obvious sources, such as ripe fruit and vegetables. Look at water from refrigerators, humidifiers, or sink drains that may be fermenting. Also look for spoiled animal food or damp, sour mops or rags. Areas outside the building near windows and doors should be checked for rotting vegetable matter. All breeding sources should be removed and disposed of in a sealed plastic bag. Make sure that screens and windows near food preparation areas are in good repair.

4) Fleas

The most common flea species in child care centers is the cat flea. This flea feeds on cats, dogs, and humans, as well as rodents, chickens, opossums, raccoons, and other animals. The dog flea and the human flea are less commonly encountered.

Fleabites cause irritation, and sometimes serious allergic responses in animals and humans.

Other, more serious, yet far less common problems are associated with the cat flea. Cat fleas can carry or transmit various organisms, such as *Yersinia pestis*, which causes bubonic plague; *Rickettsia typhi*, which causes murine typhus; and *Dipylidium caninum*, the double-pored dog tapeworm, which can live in dogs, cats, or humans.

Fleas can be a problem even when no pets are kept in the building. Adult fleas can be brought in on the clothing of staff, children or visitors. Other possible sources include urban wildlife such as rats, feral cats, raccoons, opossums, chipmunks, squirrels, or birds that may live in unused parts of buildings.

Detection is as simple as seeing fleas or noticing bites around the ankles of people in the building. Flea dirt, adult flea feces that dries and falls off a host, also may be visible.

Persistent flea problems in buildings where there are no pets may indicate the presence of rodents or other wildlife. In this case, it may be helpful to have a professional identify the fleas.

NOTE: Identifying the type of flea can be used to determine the host animal and where to search for the host or its nest.

Vacuuming

- Vacuuming on a regular basis throughout the year will keep developing flea populations low by eliminating adult fleas and their eggs.
- Vibrations caused by vacuum cleaners will stimulate new adult fleas to emerge from their pupal sacs. These new adults will be captured in the next vacuuming.
- Vacuuming is not very effective at capturing flea larvae in carpeting because the larvae coil themselves around the fibers. Vacuuming does, however, remove the dried blood on which the larvae feed.
- Use vacuum attachments to clean cracks and crevices. Caulk or seal these openings.
- Most fleas will be killed when dust in the vacuum bag suffocates them. To be sure they are killed, you can vacuum up a tablespoon of cornstarch.
- Vacuum badly infested areas thoroughly every day until the infestation is managed.
- When infestations are severe, you may need to supplement vacuuming with steam-cleaning or other management tactics.

Steam-Cleaning

The services of a steam-cleaning firm may be warranted when flea populations are severe. This process kills adult and larval fleas and probably some eggs as well; however, since the warmth and humidity from the steam also stimulates the remaining flea eggs to hatch a day or two after the cleaning, some fleas may reappear.

If the other steps recommended in this section are followed, the few fleas that hatch after steam-cleaning should represent the last of the flea population.

Flea Combs

Classroom pets in a flea-infested room should be combed regularly with a special flea comb that can be purchased at a pet store. Fleas and eggs removed from the animal should be dropped into soapy water.

Laundry

Wash removable floor coverings, such as rugs, located in areas where there are known infestations. Any bedding for classroom pets should be washed regularly.

5) Bed Bugs

Bed bugs are a growing problem worldwide. Bed bugs are not a sign of unsanitary living conditions. Experts believe the recent increase in bed bugs in the United States may be due to more travel, lack of knowledge about preventing infestations, increased resistance of bed bugs to pesticides, and ineffective pest control practices.

Adult bed bugs are visible to the naked eye. They are very small, about the size, shape and color of an apple seed. The main concern for child care centers is the transfer of bed bugs between children,

staff, and the building where the child care is located. Bed bugs are notorious stowaways and may hitch a ride in or on bags, clothing, books, and other items, so they are easily brought to and from infested places.

Bed bugs feed on blood, causing itchy bites. Bed bugs are not known to transmit or spread disease, but people may have mild to severe allergic reactions to the bites. These reactions may range from no reaction to a small bite mark to severe whole-body reactions in rare cases. Secondary bacterial infections from bites may also occur. Bed bug infestations can also cause mental health effects such as anxiety and insomnia.

Bed bugs hide in folds of fabric, seams of upholstered items, and cracks and crevices closest to sleeping areas. They are most active at night but only because that's when most of us sleep. Therefore, if we sleep during the day they will be active then as well, such as during nap time at child care facilities.

Using IPM to control Bed Bugs

- Keep all areas in the child center facility as clutter-free as possible.
- Store personal items from children and staff separately and in sealed plastic containers if possible.
- Clean regularly, especially around upholstered furniture, bedding, bookcases and items mounted on walls, such as clocks, pictures, mirrors, etc.
- Purchase equipment such as vacuums and steam cleaners specifically for bed bug control. Steam cleaners must reach 170°F to kill bed bugs. Empty and discard vacuum bags or containers immediately. Keep equipment clean and in good repair.
- Frequently wash and heat-dry all bedding, clothing, and similar items. Items should be placed in the dryer for at least 30 minutes.
- Conduct regular inspections of the child care facility. Seal cracks, crevices, and moldings with paint or caulk, as bed bugs like to hide in these areas. Secure any loose tiles, repair any holes, peeling wallpaper and chipping paint.
- Store items such as bags, blankets, toys, coats and books in sealed plastic containers when possible.
- Educate parents and staff about bed bugs and how to reduce the risk of transporting bed bugs to the child care facility and report any bed bug sightings.
- If a bed bug is spotted, capture the bug in a plastic bag or clear container for positive identification by a pest control professional.
- If bed bugs are found on a person or their belongings, this often indicates there is a problem with bed bugs at home and parents should be notified.

NOTE: Bed bugs and their eggs are resistant to most pesticides, therefore the IPM approach is likely to be more successful in preventing and removing infestations than chemical pesticide use alone.

- Since child care facilities act as a transfer point (between homes), it is more effective and safer to focus on preventing this transfer through education and building maintenance.
- Use monitoring devices such as bed bug interceptors to monitor for the presence of bed bugs.
- Bed bugs and their eggs are resistant to most pesticides, therefore the IPM approach is likely to be more successful in preventing and removing infestations than chemical pesticide use alone.
- Contact a pesticide control professional with experience in IPM to provide additional guidance.

Part B. Rodent Pests

The most common rodent pests are rats and mice. Rats and mice often enter buildings in search of food and shelter. Rats and mice consume or contaminate large quantities of food and damage structures, stored clothing, and documents. They also serve as reservoirs or vectors of numerous diseases, such as rat bite fever, leptospirosis (Weil's disease), murine typhus, rickettsialpox, plague, trichinosis, typhoid, dysentery, salmonellosis, tapeworms, and lymphocytic choriomeningitis.

Rodents can squeeze through any opening that their head can fit through. A ¼ inch opening can admit mice, and a ½ inch opening can give access to rats. Any opening that a pencil can fit through will admit a mouse.

In most cases of rodent infestation, the pest animals can be managed without having to resort to the use of poisons. Practicing good sanitation and exclusion will prevent most problems. If rodents do find their way indoors, small populations can be easily eliminated with various nontoxic methods.

Rodenticides (rodent baits) need only be used in cases of large or inaccessible infestations. Trapping rodent pests is often preferable to using baits. Traps prevent rodents from dying in inaccessible places and causing odor problems. Traps can also be used in situations where baits are not allowed.

Using IPM to control Rodents

Sanitation

Proper sanitation will do a great deal to manage rodent pests. As with insect pests, animals have three requirements for life: food, water and harborage (a place to live). Removing any one of these will force an animal to leave. Removing debris, for example piles of waste lumber or trash, and abandoned appliances, will reduce the harborages for rodent pests. Trim trees, vines, bushes, grass, and weeds at least 12 to 18 inches from all buildings to decrease cover for rodent runways and prevent hidden access to buildings.

Storage

Store pet food and seeds, such as wild bird seed in rodent-proof glass or metal containers to eliminate rodent access to these food sources. Collect and remove fallen fruit from backyard trees. Keep lids on trash cans and close dumpsters at night to make an area less attractive to rodents. The drainage holes in dumpsters should be covered with screening such as a galvanized hardware mesh (or hardware cloth) to keep rodents out.

Traps

Of the many types of rodent traps available on the market, snap traps remain the most effective. They include both the classic rodent traps with the wood base and the newer metal clothespin traps. They are designed to kill the trapped animal quickly and humanely. Snap traps should not be set where children or pets may come into contact with them.

Traps should be placed where rodents are likely to be. Rodents are creatures of habit and prefer to follow the same runways they usually use. It is important to identify these runways and place traps there. Runways can be identified by sprinkling a fine layer of flour or baby powder in suspected areas and then looking for tracks. This is a great way for tracking rodent activity, but should not be confused with the use of rodenticide tracking powders, which require a restricted-use pesticide license. Rodents often run along edges, so traps should be set along walls, especially where objects such as a box or appliance will guide them into the trap.

The type of bait used depends on the species of rodent pest. Peanut butter or gumdrops stuck to the trigger or rolled oats or birdseed sprinkled on the trap are good baits for house mice. Peanut butter, pieces of fruit or nutmeats are the best baits for roof rats.

NOTE: Snap traps should not be set where children or pets may come into contact with them.

SECTION 5. Using IPM to Manage Pests Outside the Child Care Facility (Playgrounds)

1) Mosquitoes

There are over 3,000 species of mosquitoes around the world and at least 176 can be found in the U.S. The typical lifecycle of a mosquito, from egg to adult, occurs within one week, depending on temperature. Only the female mosquito feeds on blood.

Most mosquito species seldom pose a threat to human health. However, there are several species that can transmit micro-organisms to people that cause serious disease. Even bites from mosquitoes that don't transmit disease can result in secondary infections, allergic reactions, pain, irritation, redness, and itching. Diseases carried by mosquitoes include: Zika fever, West Nile fever, malaria, yellow fever, and dengue fever.

Using IPM to control Mosquitoes

Mosquitoes breed in standing water. Remove any standing water on the property to prevent mosquitoes from breeding. Tires on playgrounds can accumulate standing water. Drilling holes in the tires promotes water drainage. Add drainage holes to any play equipment that may accumulate standing water.

2) Yellowjackets (wasps)

Yellowjackets are both beneficial and problematic wasps. They are important predators and scavengers, helping to manage pests and recycle organic materials, but they can also sting humans and their pets.

All yellowjackets are black and either yellow or white. They are rapid fliers, and are more aggressive than other types of wasps. Their nests are always enclosed with a paper envelope and can be found in the ground, hanging from eaves or tree branches, and occasionally in wall voids.

Early in the warm season, colonies are small and yellowjackets are usually not a problem. Later in the season, when colonies are at their peak, these insects then become a nuisance. In their search for protein and carbohydrate sources, they are attracted to garbage cans, dumpsters, lunch counters, and playgrounds, where they scavenge for food.

Although often grouped together with bees, yellowjackets pose a more serious threat to people. Yellowjackets can sting repeatedly, while a bee can sting only once. Multiple stings from yellowjackets are common, because they aggressively defend their nest when it is disturbed.

Stings

People can die from yellowjacket or bee stings either by experiencing large numbers of stings at once or suffer severe allergic reactions to the insect venom. These allergic reactions include soreness and swelling, not only at the site of the sting, but also on other parts of the body which may not be near the sting site.

Other symptoms include fever, chills, hives, joint and muscle pain, and swelling of the lymph glands and small air passageways. In severe cases, the individual may suffer a sudden drop in blood pressure and lose consciousness. While many individuals who experience allergic reactions have become sensitized over time by previous stings, half of all fatalities occur in individuals stung for the first time. However, ordinary reactions to stings include localized pain, itching, redness, and swelling that may last for hours and up to a day or two after the incident.

Using IPM to control Yellowjackets (wasps)

The objective of a yellowjacket management program should be to reduce contact, but not to eliminate them from the entire area since they are beneficial predators of many insects. The two most productive and least environmentally destructive ways to do this are to:

- modify the habitat to reduce yellowjackets' access to food in and around the child care center, and
- use physical controls such as trapping and nest removal.

Areawide poison baiting should be used only as a last resort when other methods have failed and stings are frequent.

Other Ways to Manage Yellowjackets:

- Exterior garbage containers should have tight-fitting lids. The cans should be emptied frequently enough to prevent the contents from impeding the closure of the lid. The lids and cans should be periodically cleaned of food wastes. Disposable liners can be used and replaced when soiled or damaged. When these practices are not followed, garbage (and the flies around it) becomes a food source for yellowjackets in the area.
- Dumpsters should be cleaned frequently by washing them with a strong stream of water. If the dumpster service company has a cleaning clause in their contract, make sure it is enforced.
- To limit yellowjacket infestations inside the child care center, repair windows and screens and caulk holes in siding.
- Avoid bright colors or floral-patterned clothing.
- Minimize sweet smelling hair rinse, lotions or soaps.
- Avoid swatting/squashing wasps; squashing wasps releases a chemical which attracts other nearby wasps.

Resources

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October 2018

Notes

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