Healthy Hospitals

Controlling Pests Without Harmful Pesticides

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A REPORT BY

BEYOND PESTICIDES

Health Care Without Harm

Beyond Pesticides

Beyond Pesticides, founded in 1981 as the National Coalition Against the Misuse of Pesticides, is a national, community-based organization of grassroots groups and individuals, which bridges environment, health, urban, and rural concerns to: (i) stimulate widespread education on the hazards of toxic pesticides, and the availability of effective alternative pest management approaches in the context of protecting the public's health; (ii) influence decision makers responsible for pest management to use safe methods through grassroots action; and, (iii) encourage the adoption of local, state, and national polices that stringently restrict pesticide use and promote alternative approaches that respect health and the environment.

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Health Care Without Harm

Health Care Without Harm (HCWH) is an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental and environmental health organizations and religious groups. Its mission is to transform the health care industry worldwide, without compromising patient safety or care, so that it is ecologically sustainable and no longer a source of harm to public health and the environment.

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Preface

Health Care Without Harm (HCWH) was born in September 1996 when representatives from 28 organizations gathered at Commonweal in Bolinas, California. Those of us who participated had a very specific agenda: to see if we had "critical mass" in opposition to medical waste incineration. We were focused primarily on the hazards of dioxin and mercury emissions, although we certainly were thinking about the broader implications of health care's environmental impacts when we developed our mission: "to transform the health care industry so that it is no longer a source of environmental harm, without compromising safety or care."

We knew that health care providers were not polluting the environment and people's bodies out of any malicious intent, but because they lacked sufficient information about the hazards of their activities. We believed that when given the data and the choice, the health care industry would choose to "first, do no harm," and indeed, this has most often been the case.

Through the work of our member organizations, Health Care Without Harm has successfully influenced the reduction of hospital emissions of dioxin and mercury and the closure of many medical waste incinerators. Our 427 member organizations include health care systems, organizations of health professionals, labor, environmental groups, religious organizations and health-advocacy groups in 52 countries.

As Health Care Without Harm has grown and our membership has become more diverse, we have looked beyond dioxin and mercury to pursue other issues that were not previously "on the radar screens" of health care administrators, staff, and clinicians, including the goal of making hospital environments safer for both patients and workers. These issues include:

- The potential health risks of phthalate plasticizers leaching from polyvinyl chloride (PVC) medical devices;
- Economically and environmentally viable alternatives to medical waste incinerators, including low-cost options for developing countries;
- The connection between what comes in the front door of the facility (purchasing) and what goes out the back (environmental services/housekeeping), and the need for good communication between all departments; and,
- The potential adverse health impacts of building materials and furnishings used in construction or remodeling of a facility.

In this report, we shine the spotlight on pesticides, another avoidable hazard commonly present in hospitals. When we began to look into this issue, we discovered there was very little information available on the quantities or types of pesticides being applied inside and outside of hospitals and clinics. Therefore, our first step was to create a survey to gather data ourselves.

We began with U.S. News & World Report's 2001 "Top Hospitals" list of 171 hospitals that received the survey, but focused on 100 facilities in or near cities where HCWH member groups were located or had contacts. Of the 171 hospitals contacted, 22 surveys were returned after numerous phone calls, letters and in some cases, visits by HCWH members. Our survey process was not intended to generate fully representative scientific data, but we believe that the data collected provide an instructive "snapshot" of what some of the nation's preeminent health care facilities are doing for pest control. The survey can also be used as a helpful tool for hospital or health systems to assess their pest management and pesticide use and to monitor their progress over time.

Although many people have come to assume that applying pesticides is the only way to control pests and ensure a clean, healthy health care facility, this report shows that pests can be successfully managed without toxic pesticides and without having an adverse effect on the quality of patient care. Health care facilities have another opportunity to "first, do no harm" by changing the way they view pest control and by following this guide to safer and effective integrated pest management.

Jackie Hunt Christensen
Health Care Without Harm
November 2003

Executive Summary

Hospitals are intended to be places for health and healing. Yet the findings of a survey of top U.S. hospitals indicate that major hospitals in the U.S. are regularly using toxic pesticides. This puts the health of patients and staff at risk and raises questions about the safety of hospitals.

In order to better understand the current state of hospital pest management, Health Care Without Harm (HCWH) distributed surveys to the 171 top U.S. hospital facilities, as cited in *U.S. News and World Report* (2001). Survey results show that while some hospitals report using least hazardous approaches and/or provide notification of pesticide use, there is still considerable pesticide use at hospital facilities, even at hospitals that report using the safer method of pest management called Integrated Pest Management (IPM). The major findings of the survey show that of the 22 responding hospitals:

- 100% use chemical pesticide products either on their grounds, inside the buildings or both;
- 91% use chemical pesticide indoors and 77% use chemical pesticides outdoors;
- 36% use pesticide products that are no longer registered for use by the U.S. Environmental Protection Agency (EPA);
- 18% use a pesticide product in which the active ingredient is being phased out by EPA due to the unacceptable risk associated with its use; and
- 73% hire a pest control company to manage the majority of the hospital's structural pest management program and 41% hire a pest control company to manage the majority of the hospital's grounds;

The survey findings also indicate that at least some of the responding hospitals are making an effort to reduce their pesticide use and/or notify staff and patients when pesticides are used, thus reducing patients' toxic exposure. Of the responding hospitals:

- 73% report using an IPM approach to pest management;
- 45% use one or more pesticide products containing boric acid, a least hazardous pesticide;
- 14% post notification signs for both indoor and outdoor pesticide applications; and,
- 27% have provided pesticide-poisoning training for their staff.

This landmark report is intended to inform hospital officials, the public and policy makers about (a) a number of potential health hazards associated with the use of pesticides in hospitals, (b) the findings of a national hospital pest management practices survey, and (c) the availability of and need for safer pest management practices and disclosure of hospital pesticide use to patients, visitors and staff.

While it is essential that hospitals maintain a clean environment free of pests that threaten health, it is also important that patients, staff, and visitors be protected from exposure to pesticides. Hospital patients who have compromised immune and nervous systems, the elderly, infants and children, and those who have an allergy or sensitivity to pesticides are particularly vulnerable to their toxic effects. Patients taking certain medications may also have heightened reactions to pesticides.

"Pest management in health care facilities differs from control practices in other types of institutions," states the Department of Veteran Affairs. "The effect on patients in various stages of debilitation and convalescence, and in varied physical and attitudinal environments, requires that a cautious, conservation policy be adopted concerning all uses of pesticides. The use of any pesticide establishes a risk of uncertain magnitude."[1]

The American Medical Association's Council on Scientific Affairs states, "Particular uncertainty exists regarding the long-term health effects of low dose pesticide exposure. Current surveillance systems are inadequate to characterize potential exposure problems related either to pesticide usage or pesticide-related illnesses. Considering these data gaps, it is prudent for homeowners, farmers, and workers to limit pesticide exposures to themselves and others, and to use the least toxic chemical pesticide or nonchemical alternative."[2]

Pesticides are hazardous chemicals designed to kill or repel insects, plants, and animals that are undesirable or that threaten human health. Many of them contain volatile compounds that contribute to poor indoor air quality. In addition to killing pests and beneficial organisms, in humans pesticides can exacerbate asthma and cause other acute adverse effects including nausea, headaches, rashes, and dizziness. Many pesticides are also linked to chronic effects, such as cancer, birth defects, neurological and

reproductive disorders, and development of chemical sensitivities. Pesticide poisonings are frequently misdiagnosed or unrecognized, largely because most health care providers receive minimal training in environmental illnesses and few people know when they have been exposed to a pesticide.

Why Focus on Hospitals?

There are 5,810 registered hospitals in the U.S.[3] that see about 32 million inpatients, 83 million outpatients and 108 million emergency room patients per year.[4] Thus a large number of individuals may be exposed to toxic pesticides in health care settings. Some hospital patients are especially vulnerable to the toxic effects of pesticides.[5]

Hospitals have a special obligation to demonstrate leadership in instituting effective and safer pest management in keeping with the medical profession's basic tenet of "first, do no harm."

Fortunately, a method of pest control called Integrated Pest Management (IPM) eliminates or greatly reduces the need to respond to pests with hazardous pesticide products and helps ensure a healthier environment for hospital patients, staff, and visitors. The focus of IPM is to prevent pest problems by reducing or eliminating sources of pest food, water, and shelter in hospitals and on their grounds and by maintaining healthy lawns and landscapes. The first approach to controlling a pest outbreak is improving sanitation, making structural repairs (such as fixing leaky pipes and caulking cracks), and using physical or mechanical controls such as screens, traps and weeders. A least hazardous chemical is used only when other strategies have failed. If a pesticide is used, the hospital community must be notified prior to the application in order to take necessary precautions.

IPM strategies are successfully being implemented at schools, parks, government facilities and hospitals nationwide. For example, IPM programs at Oregon Health and Sciences University, Brigham and Women's Hospital, Harvard University, the City of San Francisco, Seattle Parks and Recreation Department, New York City Public Schools, the General Services Administration demonstrate that IPM can be economically and effectively implemented.

This report, along with the 1995 reports, *A Failure to Protect* by Beyond Pesticides and the New York Attorney's General report *Pest Management in New York State Hospitals*, adds to the data available on the types and amounts of pesticides used at health care facilities across the country. It confirms and elaborates on previous findings that hazardous pesticides are commonly used in U.S. hospitals. (Antimicrobial chemicals are not addressed in this report.)

Recommendations

While some hospitals are using an Integrated Pest Management (IPM) approach to managing pests, it appears that the majority of U.S. hospitals have an urgent need to adopt safer pest management practices. Implementation of cost-effective IPM programs can eliminate the unnecessary use of hazardous pesticides that threaten the health of patients and staff. Hospitals, government entities, the public and the pest management industry can all take action to increase the number of hospitals adopting least hazardous IPM programs.

I. The Pesticide Problem

The U.S. Environmental Protection Agency (EPA) states that, "By their very nature, most pesticides create some risk of harm to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms."[6] And yet, with the widespread use of pesticides, including use in hospitals, people are frequently exposed to multiple pesticides in the air they breathe, the water they drink and the food they eat. It is therefore not surprising that pesticides are a major source of environmental and public health poisonings.[7]

The U.S. uses an enormous volume of pesticides—approximately 4.5 billion pounds annually. Currently, there are 890 pesticide active ingredients registered for use by EPA,[8] 320 of those are registered for use in hospitals[9] and many others are registered for lawn and landscape use.

Pesticide Toxicology

Everyday the public is exposed to toxic pesticides linked to a wide range of health problems.

Health Effects of Pesticides

Although the toxicity of individual pesticides vary, typical symptoms that can result from an acute pesticide exposure include nausea, dizziness, headaches, aching joints, mental disorientation, inability to concentrate, vomiting, convulsions, skin irritations, flu-like

FIGURE 1. WHAT IS IN A PESTICIDE?

A pesticide product is a mixture of chemicals used to kill, repel or otherwise control insects, weeds, rodents, fungi or other pests. Pesticides include insecticides, herbicides, fungicides, rodenticides, and other products active against pests. Pesticide products are formulations of a number of different materials, including active and "inert" ingredients, as well as contaminants and impurities. In addition, pesticides, when subject to various environmental conditions, break down into other materials known as metabolites, which are sometimes more toxic than the parent material.

Active Ingredients, usually the only components of the formulation listed on the pesticide label, are biologically and chemically active against a target pest. By definition it is these chemicals that kill or repel living things. Active ingredients also include synergists.

"Inert" Ingredients are the carrier or sticking agent in the pesticide product. They may be solvents, stabilizers, preservatives, surfactants, sticking or spreading agents, or defoamers.[10] Quite often these ingredients constitute over 95% of the pesticide product. Some "inert" ingredients are as or more toxic than the active ingredient and/or may be an active ingredient in another pesticide product.

Synergists are chemicals that are added to a pesticide product to increase the potency of the active ingredient(s). Piperonyl butoxide (PBO) and n-octyl bicycloheptene dicarbozimide are pesticide synergists that reduce insects' ability to breakdown the active ingredient. PBO is a liver toxicant and a possible human carcinogen.[11] Pyrethroid, pyrethrin, and carbamate-containing pesticide products are the pesticides that most often contain PBO.

Contaminants and Impurities are byproducts of the manufacturing process that are often found in pesticide products and can contribute to a product's toxicity. For example, dioxin has been identified as a contaminant in some herbicides.[12]

Metabolites are breakdown products that form when a pesticide is exposed to air, water, soil, sunlight or living organisms. Often the metabolite is more hazardous than the parent compound.

General Use Pesticide vs. Restricted Use Pesticide
By law, pesticide products must be registered by EPA and the state in which they are used, and applied according to label instructions. General use pesticides can be applied by anyone, whereas restricted use pesticides may only be applied by licensed applicators.

FIGURE 2.
PESTICIDE TOXICITY WARNING LABEL

Pesticide product labels contain a toxicity warning signal word of either "Danger" for the highest toxicity category, "Warning" for moderate toxicity, or "Caution" for the lowest toxicity. The toxicity ratings only apply to the acute toxicity of the product. The warning labels, therefore, do not take into account a product's ability to cause chronic effects such as cancer, birth defects, genetic mutations, multiple chemical sensitivities (MCS), or other long-term damage to the respiratory, immune or neurological systems.

In addition, the acute toxicity categories ignore the substantial variations in health impacts of pesticides on different people. For example, individuals who have allergies or sensitivities to pesticides can be made very sick from exposures to pesticides even if those pesticides carry a low acute toxicity rating.

symptoms and asthma-like problems.[13] In some cases, a person can develop chronic health problems following an acute poisoning.[14] Low-level pesticide exposure over a period of time may also result in chronic health effects. Pesticides are linked to a wide range of chronic health problems including cancer, birth defects, genetic damage, neurological, psychological and behavioral effects, blood disorders, chemical sensitivities, reproductive effects, and abnormalities in liver, kidney, and immune system function.[15]

Many insecticides, herbicides and fungicides are linked to certain types of cancer, including those of the lip, stomach, and prostate, as well as leukemia, lymphatic cancers, and multiple myeloma.[16] Non-Hodgkin's lymphoma has been linked to the use of the commonly used weed killer 2,4-D.[17] Studies show that children living in households where pesticides are used suffer elevated rates of leukemia, brain cancer and soft tissue sarcoma.[18]

Pregnant women, children, the chemically sensitive, elderly and chronically ill are at greater risk from pesticide exposure than others. Studies in laboratory animals raise concerns that patients taking certain medications may also have heightened reactions to some pesticides.[19] Pesticides can affect the immune and nervous system and result in increased problems with allergies, asthma, and hypersensitivity to chemicals.[20] Some individuals with multiple chemical sensitivities (MCS), i.e. those with the most severe chemical sensitivities, have been reported to react adversely to even minute levels of pesticide residues, including those resulting from pesticide applications made months or even years earlier.[21]

Pesticide poisonings are frequently misdiagnosed or unrecognized. All too often victims of pesticide exposure never realize the source of their symptoms or illness, even after visiting a physician.[22] Unfortunately, most health care providers receive minimal training in environmental illnesses. EPA and other government agencies have teamed with the National Environmental Education & Training Foundation (NEETF) to try to address this problem. They have published the *National Strategies for Health Care Providers: Pesticides Initiative Implementation Plan*, a 10-year plan designed to improve prevention, recognition and management of pesticide poisonings by increasing the education of physicians, nurses and other health care providers about pesticides.[23]

The Hazards of "Inert" Ingredients

While most discussion on pesticides focuses on active ingredients, pesticide formulations contain a majority of so-called "inert" ingredients. They form the solution, dust, or granule in which the active ingredient is mixed and generally make up the largest percentage of ingredients in a pesticide product. Many are petrochemical solvents like acetone, fuel oil, toluene and other benzene-like chemicals.[28] Despite the term "inert," these ingredients may not be chemically, biologically or toxicologically inert. In fact, "inert" ingredients can be more toxic than the active ingredient and/or be an active ingredient in another pesticide product.[29]

Under the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA), pesticide manufacturers are only required to reveal the active ingredients in a pesticide. The law allows "inert" ingredients to remain trade secret information. This leaves consumers and applicators unaware of the possible toxic chemicals present in the "inert" ingredients of pesticide products they are using.

A 2000 report by the New York State Attorney General, *The Secret Ingredients in Pesticides: Reducing the Risk*, found that 72 percent of pesticide products available to consumers contain over 95 percent "inert" ingredients; fewer than 10 percent of pesticide products list any of the "inert" ingredients on their labels; and, of a 1995 list of "inert" ingredients, 394 chemicals were listed as active ingredients in other pesticide products.[30]

In general, EPA requires little toxicity data from manufacturers on "inert" ingredients before registering a pesticide product. However, many of these chemicals are known to state,

FIGURE 3.
HOSPITAL PESTICIDE INCIDENT REPORTS

A hospital staff person in **Oklahoma** became sick after she was exposed to Dursban 4E™ (active ingredient chlorpyrifos) on the job. Following the exposure, she became sensitive to a host of chemicals.[24] A medical professional diagnosed her as having been poisoned by the pesticide. After the incident was reported to the Oklahoma Department of Agriculture and EPA, the hospital was cited for improper use of pesticides.[25]

A woman in **Pennsylvania** was sitting in a hospital waiting room when she developed difficulty breathing and nausea. She noticed a strong odor. It turned out to be the fumes of the insecticide Ficam™ (active ingredient bendiocarb) being sprayed by a commercial pest control company in an adjacent room. The applicator told her that it would not hurt her and led her to believe that the pesticide was safe. The woman's doctor conducted urine, blood and nerve tests and diagnosed her as having been poisoned by a pesticide. She reported the incident to the Pennsylvania Department of Health, but their investigation found that the company had not misapplied the pesticide and that there was nothing more they could do. The woman wrote a letter to the hospital voicing her concerns about chemicals used at the hospital. The hospital wrote a letter in response stating, "The pesticides used … are acceptable for use in medical facilities and do not jeopardize the health of staff and/or patients." The hospital stated that the pest control contractor would make future pesticide applications "as late in the clinic day as possible."[26]

A woman entered the outpatient area of a **New Jersey** hospital for laboratory testing early one Saturday morning. She immediately experienced a severe headache, weakness and tremors. She asked the only hospital employee in the vicinity if any chemicals had been used in the area. She was told that someone had just sprayed pesticides. She immediately returned home and later placed a number of calls to the hospital but was unable to obtain any additional information on the pesticide application. In a separate incident at this same facility, the woman was being dropped off at the entrance to the outpatient lab. As she began to get out of the car, she saw an individual in protective clothing and a respirator spraying lawn care pesticides at the building entrance, about 10 feet from her. She left immediately and was driven home. Nevertheless, those few minutes of exposure were sufficient to cause a severe reaction that included visual disturbances, headache, difficulty breathing, tremors, severe weakness, and confusion. She was in bed for two days following the exposure with severe fatigue and weakness.[27]

federal and international agencies to be hazardous to human health. According to an investigative report by the Northwest Coalition for Alternatives to Pesticides, 209 "inerts" used in pesticide products are identified as hazardous pollutants in federal environmental statutes governing air and water quality, 14 have been assessed as "extremely hazardous," 84 are reportable to the Toxic Chemical Release Inventory, 21 are known or suspected carcinogens, and 127 are regarded as occupational hazards.[31]

"Many consumers are mislead by the term 'inert ingredients,' believing it to mean 'harmless,'" states EPA. "Since neither the federal law nor the regulations define the term 'inert' on the basis of toxicity, hazard or risk to humans, nontarget species, or the environment, it should not be assumed that all inert ingredients are nontoxic."[32] In 1997, EPA began asking pesticide registrants to voluntarily refer to "inert" ingredients as "other" ingredients on product labels in order to try to minimize the misconception that inert ingredients are harmless.[33] However, few manufacturers have done so.

Pesticide Exposure Routes

Human exposure to pesticides takes place by breathing in pesticide fumes or dust laden with pesticides, consuming water or food contaminated with pesticides, or by touching surfaces contaminated with pesticides and absorbing them through the skin. When an individual detects a pesticide's odor, that person is also inhaling the pesticide. And, even if no odor is detected, such as after "low odor" products are applied, one can still be breathing in the pesticide's vapors. If touched, pesticide residues can be absorbed through the skin. This type of exposure commonly occurs when children or

pets roll around on lawns that have been treated with herbicides. Despite a common misconception, harmful exposure to a pesticide does not end when a pesticide dries. The residues can linger for hours, days and even months after an application.[34] Pesticides can also be tracked inside from outdoor applications or carried from a treated part of a building to an untreated section.

In a study looking at the persistence of pesticides, airborne concentrations of seven insecticides were tested for three days following their application in separate rooms in an unoccupied dormitory. Six of the seven pesticides were found in air samples in the room in which they were applied through the third day.[35] EPA's *Non-Occupational Pesticide Exposure Study* (NOPES) found that tested households had at least 5 pesticides in indoor air, at levels often 10 times greater than levels measured in outdoor air.[36] A recent study found that 2,4-D, the most commonly applied lawn herbicide in the country,[37] is easily tracked indoors, contaminating the air and surfaces inside residences at levels ten times higher than pre-application levels.[38] The type of pesticide formulation and application method influences the potential for human exposure. Spraying a pesticide suspends the chemical into the air resulting in a greater potential for the chemical to drift from the application site. Baits generally are of low or very low volatility and are not likely to pose the high exposure risks associated with sprays. A small percentage of sprayed pesticides, whether applied indoors or outdoors, reaches the target organism.[39] When pesticides are sprayed outdoors there is almost inevitable pesticide drift on to non-target areas via wind or thermal currents.[40]

Just this year, there have been several studies that confirm that exposure to pesticides and other chemicals leads to human contamination. In January 2003, the Centers for Disease Control and Prevention (CDC) released the second *National Report on Human Exposure to Environmental Chemicals*, which found evidence of 89 chemicals, out of 116 tested, in the blood or urine of study participants. The chemicals found in study participants included several types of pesticides (organophosphate, organochlorine, and carbamate insecticides; herbicides; pest repellents; and disinfectants).[42] A similar study, *Body Burden: the Pollution in People*, led by Mount Sinai School of Medicine in New York in collaboration with the Environmental Working Group and Commonweal, was released in February 2003 on chemicals found in nine study volunteers. These individuals were tested for 210 chemicals, the largest suite of industrial chemicals ever surveyed. The researchers found an average of 91 industrial compounds, pollutants and other chemicals in the blood and urine of all nine volunteers. In total, 167 chemicals were found in the group. This included the detection of seven of nine organophosphate metabolites tested and 10 of 23 organochlorine pesticides and metabolites tested.[43]

FIGURE 4.
ILLINOIS HOSPITAL PESTICIDE USE RESTRICTION

Illinois is the only state with a law that prohibits the use of certain pesticides while patients are in the treated area.[41]

Pesticide Efficacy and Resistance

EPA continues to allow the release of synthetic toxic pesticides into the environment without a full assessment of the efficacy of these products or the development of pest resistance over time. The result has been the release of hazardous materials, including arsenic, organochlorine, organophosphate, carbamate, synthetic pyrethroid and other chemical families, that no longer eliminate pests, while leaving a trail of adverse toxic effects.

Reliance on pesticides is a reactive measure, a symptomatic approach to managing pest problems. Applying pesticides on a routine schedule tends to support the habit of ignoring the causes of pest infestations. Pesticides are often temporary fixes and ineffective over the long term. Pesticides usually require repetitive use. Spraying for ants, for example, tends to kill only the worker insects, while the queen is safe back in the colony. Since the queen can produce more worker ants, the pest problem is not solved.[44]

Hundreds of species of insects, plant pathogens, fungi, nematodes, rodents and weeds have become resistant to pesticides. Resistance "… has become most serious since the discovery and widespread use of synthetic organic compounds," according to the National Academy of Sciences (NAS). The 1986 report explains why this is the case:

> "Some individuals in a pest population may be able to survive initial applications of a chemical designed to kill them, and this survival may be due to genetic differences rather than to escape from full exposure. The breeding population that survives initial applications of pesticide is made up of an ever-increasing proportion of individuals that are able to resist the compound and to pass

FIGURE 5. OVERVIEW OF COMMONLY USED HERBICIDES

2,4-D (Trimec™) At A Glance

2,4-D is the most commonly used non-agriculture herbicide in the U.S.[46] It is frequently applied to lawns to control broadleaf weeds and is often found in fertilizer products along with other phenoxy herbicides, such as dicamba, mecoprop (MCPP), and MCPA. 2,4-D is easily absorbed through the skin and lungs.[47] Symptoms of 2,4-D poisoning include drowsiness, vomiting, convulsions, kidney and liver injury, and muscle twitching. Long-term exposure to 2,4-D has been reported to cause liver damage.[48]

Exposure to 2,4-D and other phenoxy herbicides have also been linked with an increased risk of specific cancers of the lymphatic and blood systems. The link between 2,4-D exposure and non-Hodgkin's lymphoma has been documented in several studies in Sweden, Canada, Nebraska, Kansas and Washington.[49] A study conducted by the National Cancer Institute found elevated rates of canine lymphoma in dogs living in households where 2,4-D was used.[50] A 2002 study by researchers at the University of Michigan found that 2,4-D is frequently contaminated with dioxins.[51] Dioxins are highly toxic chemicals that can cause cancer and reproductive harm.[52]

2,4-D is also an endocrine disruptor.[53] In animal studies, it has been shown to decrease blood levels of thyroid hormones[54] and increase the production of female sex hormones by male testes.[55] Studies on farmers who have been exposed to 2,4-D have found they have lowered sperm counts[56] and there is growing evidence they may have more children with birth defects.[57] A U.S. Forest Service fact sheet advises that female employees not spray 2,4-D because of concern that it could pose a risk to fertility, reproduction and offspring development.[58]

Another study found that 2,4-D is easily tracked indoors and can contaminate the air and surfaces inside residences at levels ten times higher than pre-application levels. The study, *Distribution of 2,4-D in Air and on Surfaces inside Residences after Lawn Applications: Comparing Exposure Estimates from Various Media for Young Children*, found that a homeowner applicator and an active dog are the greatest contributing factors to tracking the herbicide into homes. Re-suspension of floor dust results in the greatest amount of 2,4-D in indoor air and on tables and windowsills.[59] The study's lead researcher, Marcia Nishioka, also published a similar study in 1996, *Measuring Transport of Lawn-Applied Herbicide Acids from Turf to Home: Correlation of Dislodgeable 2,4-D Turf Residues with Carpet Dust and Carpet Surface Residues*, that found residues of 2,4-D and dicamba on indoor carpet surfaces and carpet dust after a lawn application.[60]

Glyphosate (RoundupTM) At A Glance

Glyphosate is a widely used broad-spectrum herbicide. It is the second most commonly used herbicide for nonagricultural purposes.[61] It is moderately persistent in soil, with an average half-life of 47 days, although there are studies reporting field half-lives of up to 174 days.[62] Glyphosate can be acutely toxic to humans and animals. Symptoms of exposure include eye, skin, and upper respiratory tract irritation, vomiting, respiratory dysfunction, and low blood pressure.[63] The surfactant polyethoxylated tallowamine (POEA) used in the glyphosate-containing product Roundup, is more acutely toxic than glyphosate itself.[64]

Besides POEA, glyphosate products have been reported to contain ammonium sulfate, benziothiazolone, 3-iodo-2-propynyl butylcarbamate (IPBC), isobutane, isopropylamine, methyl pyrrolidionone, pelargonic acid, sodium sulfite and sorbic acid. These chemicals are associated with a range of acute effects, including eye irritation, nausea, diarrhea, skin and respiratory reactions, and miscarriages and weight loss in animal tests.[65] According to the California Department of Pesticide Regulation, glyphosate ranks first among herbicides as the cause of pesticide-related illness in people in California.[66]

Recent reports link exposure to glyphosate to an increased risk of cancer. Recent studies show a link between the cancer non-Hodgkin's lymphoma and glyphosate exposure.[67] Animal studies have found increases in testicular, kidney, pancreatic and liver tumors and cancer of the thyroid in exposed animals.[68] In addition, glyphosate-containing products have been shown to cause genetic damage.[69]

FIGURE 6. OVERVIEW OF COMMONLY USED INSECTICIDES

Acephate (Orthene™) At A Glance

This organophosphate insecticide (like other organophosphates, such as diazinon, chlorpyrifos, and malathion) inhibits acetylcholine esterase (AchE), an essential nervous system enzyme. Symptoms of acephate poisoning include headaches, fatigue, stomach cramps, nausea, and in extreme cases, respiratory depression.[70] Acephate breaks down to methamidophos, another organophosphate pesticide. EPA has classified acephate as a possible human carcinogen (Group C).[71] Oncogenicity test results found an increased incidence of adrenal medullary tumors and pituitary tumors in male rats when compared with experimental controls. In female mice, an increased incidence of liver tumors and liver hyperplasic nodules, thought to be precursors to tumors, was seen at the highest doses tested.[72]

Pyrethroids (Tempo™, Cynoff™, Talstar™, Suspend™) At A Glance

With the phase out of several organophosphate pesticides products, pyrethroids insecticides are becoming some of the most commonly used insecticides in offices, buildings and homes. Pesticide products containing pyrethroids are often described by pest control operators as "safe as chrysanthemum flowers," but this is quite misleading. While pyrethroids are a synthetic version of an extract from a chrysanthemum plant, they are chemically engineered to be more toxic to insects and to take longer to break down.[73] They are often formulated with synergists that increase their potency by compromising the ability of insects to detoxify the pesticide. Pyrethroids include the active ingredients bifenthrin, cyfluthrin, cyhalothrin, cypermethrin, deltamethrin, and permethrin, among others. There is a range of toxicity between formulations and amongst the differing pyrethroid compounds themselves.

Pyrethroids act by inhibiting the nervous system of insects.[74] They are also toxic to the human nervous system. Signs and symptoms of pyrethroid poisoning include stinging, burning, and numbness of the skin, abnormal facial sensation, dizziness, salivation, headache, fatigue, vomiting, diarrhea and irritability to sound and touch. In more severe cases, pulmonary edema, muscle twitching, and seizures can develop.[75] Based on tests with laboratory animals, it appears that newborns may be more sensitive to some pyrethroids than adults.[76]

Pyrethroids have been linked to disruption of the endocrine system. Some pyrethroids have demonstrated estrogenic properties in in-vitro laboratory studies.[77] EPA classifies some pyrethroids as possible human carcinogens (Group C).[78]

Because pyrethroids are toxic to all insects, both beneficial insects and pests are affected by pyrethroid applications. In some cases, predator insects may be susceptible to a lower dose than the insect pest on which it preys, disrupting the predator-prey relationship. Both pyrethroids and pyrethrins are often formulated with oils or petroleum distillates and packaged in combination with toxic synergists, such as piperonyl butoxide (PBO) and n-octyl bicycloheptene dicarboximide.[79]

Piperonyl Butoxide At A Glance

Piperonyl butoxide (PBO) is a chemical that acts synergistically with the active ingredient of a pesticide product to increase its potency. It is a liver poison that is added to pesticide products to reduce insects' ability to break down and detoxify the active ingredient.[80] A typical pesticide product contains 5 to 20 times more synergist than active ingredient. Pyrethroids, pyrethrins, rotenone and carbamates are the active ingredients most often formulated in combination with PBO.[81] In addition to the symptoms induced by the active ingredients, signs of PBO poisoning include anorexia, vomiting, diarrhea, intestinal inflammation, pulmonary hemorrhage and perhaps central nervous system depression. Repeated contact may cause slight skin irritation.[82] Chronic toxicity studies have shown increased liver weights in test animals, even at the lowest doses. Animal studies have also shown hepatocellular carcinomas even at low exposure levels.[83] EPA considers PBO to be a possible human carcinogen (Group C).[84]

this characteristic on to their offspring. Because pesticide users often assume that the survivors did not receive a lethal dose, they may react by increasing the pesticide dosage and frequency of application, which results in a further loss of susceptible pests and an increase in the proportion of resistant individuals."[45]

Pesticide Regulation

There is a common misconception that if pesticides are registered by EPA then they are safe to use. The U.S. General Accounting Office has told Congress on several occasions that, "The general public receives limited and misleading information on pesticide hazards" and is misled on pesticide safety by pesticide applicator statements characterizing pesticides as "safe" or "harmless."[85]

While the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA) and the *Food Quality Protection Act* (FQPA) regulate pesticides, there are a number of reasons why the two laws do not adequately protect human health and the environment:

1. When EPA registers a pesticide, it considers economic costs and benefits in addition to the potential adverse health and environmental impacts of a product. This means that EPA can register any pesticide, regardless of its toxicity, if it believes the estimated benefits outweigh the hazards.
2. Most toxicity testing is only done on the active ingredient. There is limited testing of inert ingredients or the full product formulation.
3. Pesticides are not tested for their cumulative effects or synergistic interactions with other pesticides, environmental pollutants, or pharmaceuticals.
4. There is inadequate testing for short- and long-term neurological, immunological, and endocrine (hormone)-disrupting effects.
5. There is inadequate testing for impacts on vulnerable populations, such as children, pregnant women, the elderly, and those with chemical sensitivities or other chronic illnesses involving the immune, neurological, respiratory, and/or endocrine systems. Toxicity assessments are usually done for healthy adult males.
6. Many pesticides in common use were registered before more stringent regulations were enacted and have not completed EPA's re-registration process to determine whether they should continue to be registered. In the meantime potentially hazardous exposures can continue.
7. There is inadequate tracking of pesticide use, exposures, and poisonings.

Limited and Misleading Information on Product Label

Most pesticide information is made available to the user through the label. Labels advise on appropriate application methods and may contain precautionary information, such as recommending protective clothing. Health information is usually limited to warnings about possible immediate health effects resulting from exposure to the active ingredient. Labels do not provide information on chronic effects, or display EPA's carcinogenicity rating.[87] As stated earlier, "inert" ingredients are not required to be listed by name on a pesticide label. Manufacturers are also required to provide Material Safety Data Sheets (MSDSs) on their pesticide products, but there is no government review or approval of the information provided. Thus, while MSDSs provide more information on health effects than product labels, the information is still limited. Therefore, they should not be relied on for health information.[88]

FIGURE 7. PESTICIDE REGISTRATION DOES NOT EQUAL SAFETY

After allowing Dursban™, active ingredient chlorpyrifos, to be used for 30 years, EPA reached an agreement with Dow AgroSciences to phase out many structural uses of chlorpyrifos-containing products, because they posed an unacceptably high risk to children. Chlorpyrifos had been one of the most commonly used insecticides in homes, gardens, schools, office buildings, hospitals, and other indoor settings. Although, as of December 31, 2001, it can no longer be purchased for many residential and non-residential uses, chlorpyrifos products can continue to be used until existing stocks are depleted. Agricultural, golf course, mosquito control and containerized baits use are allowed to continue indefinitely.[86]

Missing Toxicity Data

While the EPA pesticide registration and re-registration process is intended to evaluate the safety of pesticides, there are numerous deficiencies in the process. EPA has identified much missing data on older pesticides that are undergoing the re-registration process. In addition, if chemicals fall under the category of terrestrial non-food use pesticides, the toxicity data requirements are less rigorous. The battery of chronic toxicity data, including the potential to cause cancer, birth defects, and reproductive effects, is only required of pesticides if they have food or feed uses.[89] While most commonly used pesticides do also have food or feed uses and undergo some chronic toxicity testing, this does not guarantee the existence of complete toxicity information. Moreover, public exposures to pesticides are generally underestimated by EPA.

Pesticide Laws Allow An "Acceptable" Risk

The laws that regulate pesticides contain an *assumption* that toxic pesticides are necessary tools in pest management. EPA states that, "economic benefits from pesticide use are not achieved without potential risks to human health and the environment due to the toxicity of pesticide chemicals."[90] Therefore, the law allows harm and illness to occur when these chemicals are used. In reality, there are usually non-toxic ways to manage pests. These include maintenance practices that prevent or exclude pests, and mechanical devices and biological materials that control them. In most cases, the causes of an insect infestation or mold growth, for example, can be identified and corrected. Other times, the use of mechanical traps and pheromone attractants can be effective. Nevertheless, because the benefits of pesticides are assumed to be high, it is rationalized that some degree of disease and poisoning are "acceptable."[91]

II. Hospital Pesticide Use Survey Findings

Methodology

Health Care Without Harm distributed a *Hospital Pesticide Use Survey* to the top 171 hospitals listed by the *U.S. News and World Report* in 2001 (for a copy of the survey, see pages 44-46). The survey included questions about the use of chemical pesticides, methods of notifying staff, patients, and the public of pesticide applications, record keeping, and Integrated Pest Management (IPM). It also asked for the names of pesticides used at the site. In some cases the survey responses were incomplete. Hospitals were promised that their identity would be kept confidential.

Twenty-two hospitals (13%) responded to the survey. Although this was a relatively low response rate, the results were consistent with reported pesticide use in New York hospitals,[92] schools and other public buildings and grounds. It also highlighted the fact that it is often very difficult to obtain information about pesticide usage in any location.

Because the surveys were returned by hospitals that elected to do so, it can be assumed that there is a potential bias in the respondents. The survey findings probably over-represent hospitals that have begun to move away from pesticide dependency and/or towards providing pesticide use notification, and under-represents the number and toxicity of pesticide products that are being used at hospitals nationwide. Thus, the use of pesticides in U.S. hospitals is likely to be greater than what is represented here.

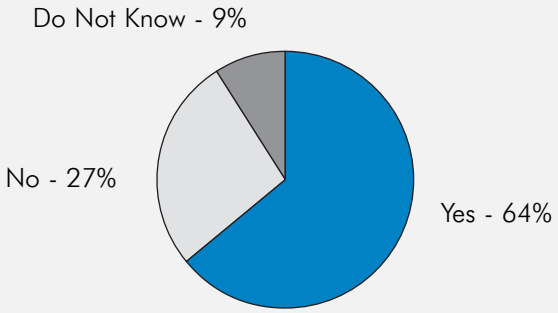
Summary of Survey Findings

Twenty-two hospitals (13%) from twelve states and the District of Columbia responded to the survey. The surveys were usually completed by the hospital's Environmental Services Manager or Director or others responsible for overseeing the pest management program, whether the program was in-house or done by a commercial pest control company. The majority of the hospitals in the response group are urban non-profit hospitals affiliated with a university. A total of 10,015 hospital beds are represented in the response group. The hospitals' capacities range from 93 to 998 beds and include one outpatient facility.

The survey finds that of the responding hospitals:

- 64% have a written pest management plan;
- 73% claim to use an IPM approach to pest management;
- 73% hire a pest control company to manage the majority (98% or greater) of the hospital's structural pest management program;
- 36% hire a pest control company to manage the majority (98% or greater) of the hospital's grounds;
- 91% use chemical pesticide indoors and 77% use chemical pesticides outdoors;

FIGURE 8.
HOSPITALS WITH WRITTEN PEST MANAGEMENT PLANS



- 100% use chemical pesticide products either on its grounds, inside the buildings or both;
- 45% use one or more pesticide products containing boric acid, a least hazardous pesticide, which was the most commonly used pesticide by surveyed hospitals;
- 36% use pesticide products that are no longer registered for use by EPA;
- 18% use a pesticide product in which the active ingredient is being phased out by EPA due to the unacceptable risk associated with its use;
- 14% post notification signs for both indoor and outdoor pesticide applications;
- 91% have copies of the pesticide products' Material Safety Data Sheet (MSDS) available to staff for all pesticide products it uses;

- 27% have provided pesticide-poisoning training to their staff;
- 77% keep records of structural pesticide applications;
- 64% keep records of outdoor pesticide applications; and,
- $55 per bed is the average annual cost of pest management.

Hospital Pest Management Plans

Hospital pest management plans help direct a hospital in carrying out its pest control practices. A total of 14 hospitals surveyed (64%) indicate that they have a written pest management plan. Two hospitals (9%) report they do not have a plan and six (27%) do not know if they have one or did not answer the question.

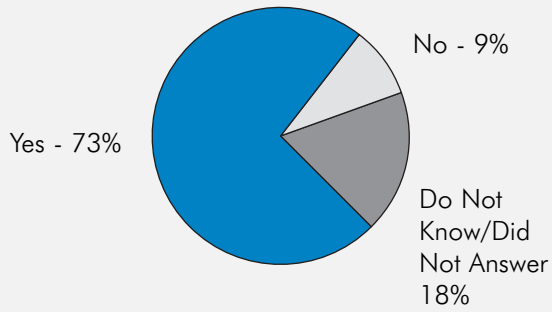
Hospital IPM Programs

An IPM program is a pest management approach to preventing and managing pest problems in the least hazardous manner possible. Unfortunately, IPM is a term that is used loosely with many different definitions and methods of implementation. It is not uncommon, for example, for someone to even call a traditional pesticide spray program IPM. Because the survey question did not define IPM and only requested a "yes," "no," or "do not know" response to whether the hospital uses an IPM approach to pest management, the quality of the respondents' IPM programs cannot be gauged.

A total of 16 responding hospitals (73%) indicate they use an IPM approach to pest management. Two others (9%) report they do not use IPM and four (18%) do not know if they do or did not answer the question.

The following are comments that some hospitals provided regarding their pest management program. These comments show that some hospitals are successfully implementing a least hazardous IPM approach. Based on an analysis of the survey findings, these hospitals use few or no hazardous pesticides.

FIGURE 9. HOSPITALS USING AN IPM APPROACH



- Hospital A's structural pest control program goal is to be "pesticide-free." Good sanitation, food and water source reduction, and pest trapping, are successful strategies that are implemented in managing pests. They do occasionally use boric acid products as a preventive measure inside wall voids during construction and renovation or after trapping and mechanical measures were not completely successful in suppressing insect populations.
- Hospital B has an IPM program that emphasizes pest prevention through good sanitation practices and maintaining structures in optimum repair. Their program has been in place for more than a decade. Pesticides are used only when needed, primarily in baits. Records are kept of all pesticide applications. The hospital has a full-time licensed pest control technician that is supervised by an entomologist. The frequency of pest problems is largely seasonal and related to the traffic in the various buildings.
- Hospital C's ground maintenance department has been implementing an IPM program for over ten years. It has reduced the use of insecticides on its 130-acre campus by 75 percent. The returned survey states, "With IPM practices, we have maintained a safer environment for our staff, patients, and visitors." Herbicides are only applied when other methods of weed control have failed. They are looking into more ways to decrease their herbicide use.
- Hospital D has also had an IPM program for over ten years. The company that it hires for pest control services identifies potential problem areas during construction so the open areas can be caulked or sealed. The hospital does not spray pesticides in patient care areas. The returned survey also states that the pest control technician used to spray the exterior of the building for cluster flies, but two

years ago started using Victor™ fly paper and Cluster Busters™ to trap the flies.

While the returned surveys indicate that the majority of responding hospitals have IPM programs, many hospital IPM practices are severely undermined by a continued reliance on hazardous pesticides. For example, five of the 16 responding hospitals (31%) state that their IPM program uses between 18 and 38 pesticide products. This highlights the fact that there are many different definitions of IPM. While true least hazardous IPM programs use few or no synthetic pesticides, the term IPM is increasingly being used by the pest control industry to describe programs that include synthetic pesticides or are, in fact, just traditional spray programs.

In-House versus Contract Pest Management

For three years in a row, the Hospitals and Health Networks' (HHN) *Contract Management Survey* found that pest control topped the list of hospital-contracted services. More than 85 percent of respondents reported hiring outside vendors to manage pest problems, citing cost savings and availability of specialized expertise as the top reasons for outsourcing. HHN expects the number of hospitals that outsource for lawn care and grounds to continue to rise.[93]

FIGURE 10.
HOSPITAL STRUCTURAL PEST MANAGEMENT, MANAGED IN-HOUSE OR BY HIRED COMPANY[132]

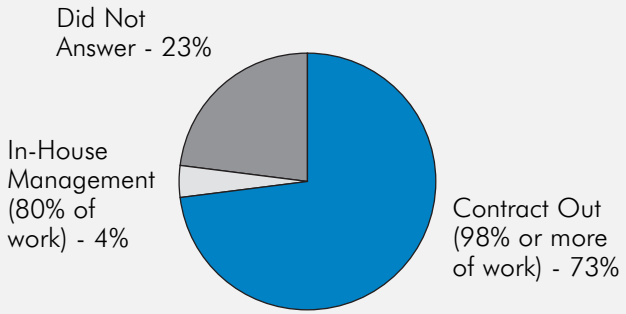
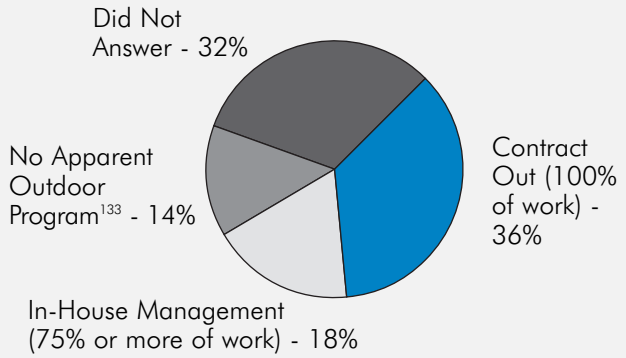


FIGURE 11.
OUTDOOR HOSPITAL PEST MANAGEMENT, MANAGED IN-HOUSE OR BY HIRED COMPANY[132]



Hospitals that use commercial pest control contractors generally are less likely to follow true IPM practices than those that use their own employees to conduct the pest management program.[94] In addition, hospital facility managers are often unaware of the contractor's methods, products, or activities and thus may make false assumptions about the type of IPM the contractor is implementing. This lack of information makes it virtually impossible to implement and manage a successful IPM program, which requires informed decision-making.

The majority of surveyed hospitals report that they contract with a commercial company for their pest control services.

- Sixteen responding hospitals (73%) hire a pest control company for the majority (98% or greater) of the hospitals structural (indoor) pest management. One hospital has a company implement 20% of its structural pest management program and has the in-house pest management staff do the other 80%.
- Eight responding hospitals (36%) hire a company to manage 100% of the hospital's grounds.
- Nine responding hospitals (41%) contract out all or a majority of their structural and outdoor pest management, while seven responding hospitals (32%) contract out for structural pest management only.
- Four hospitals (18%) have their own employees take care of the majority (75% or greater) of their outdoor pest management, including one hospital (5%) whose staff manages both structural and outdoor areas.

FIGURE 12. HOSPITALS' INDOOR CHEMICAL PESTICIDE USE

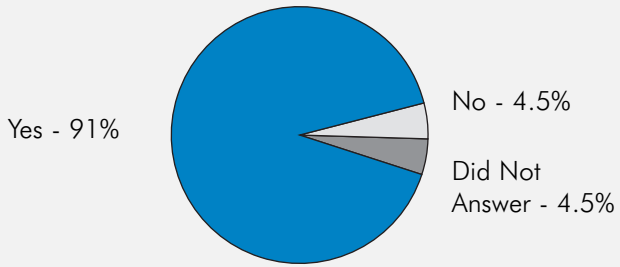
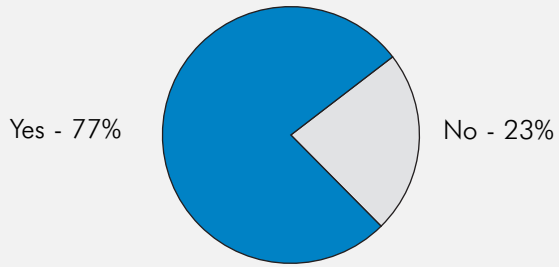


FIGURE 13. HOSPITALS' OUTDOOR CHEMICAL PESTICIDE USE



Hospital Pesticide Use

Although one responding hospital (5%) does not use chemical pesticides indoors and two other hospitals (9%) do not use chemical pesticides outdoors, all of the responding hospitals use chemical pesticide products either on their grounds, inside their buildings or both. Not one of the surveyed hospitals' pest management programs is 100% free of chemical pesticides. A total of 20 responding hospitals (91%) use chemical pesticide products inside the hospital and 17 (77%) use chemical pesticide products on hospital grounds. One hospital (5%) states that they do not spray pesticides around patients.

Seventeen hospitals (77%) provided a list of pesticides used at their facility. Of the 216 pesticide products reported, 159 are different pesticide products containing 80 different active ingredients. The number of products used by a single facility ranges from one to 38, averaging nearly 13 pesticide products per hospital.

Of the 37 most commonly used pesticides (active ingredients) identified from the hospital survey responses:

- 62% are insecticides, including synergists;
- 27% are herbicides;
- 8% are rodenticides; and,
- 3% are fungicides.

Of the insecticides identified as part of the 37 most commonly used pesticide active ingredients by surveyed hospitals: six (26%) are pyrethroids; three (13%) are organophosphates; three (13%) are carbamates; two (9%) are botanicals; two (9%) are inorganics; two (9%) are synergists; and the remaining five (21%) represent other chemical families that only occur once.

Phenoxy herbicides (e.g., 2,4-D, dicamba, and mecoprop) are the most commonly used herbicides identified as part of the 37 most

FIGURE 14. SURVEYED HOSPITALS MOST COMMONLY USED INSECTICIDES, BY CHEMICAL FAMILY

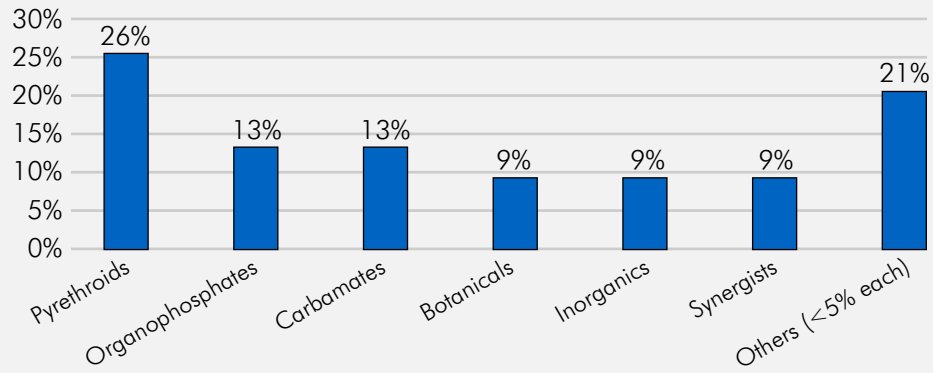
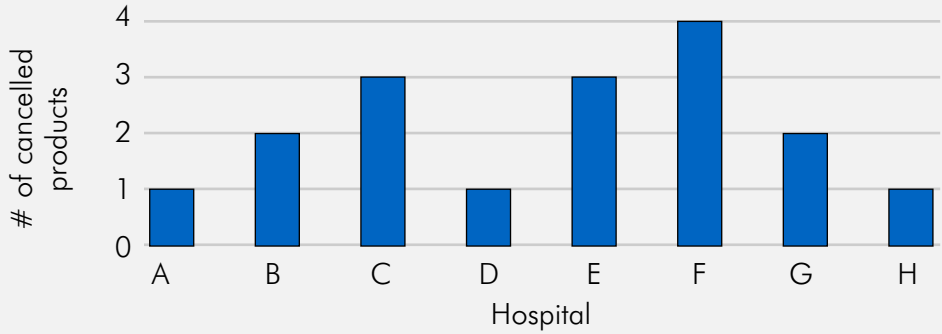


FIGURE 15.
HOSPITAL USE OF CANCELLED PESTICIDE PRODUCTS



commonly used pesticide active ingredients by surveyed hospitals.

Of the 37 most commonly used pesticides by surveyed hospitals (see Figure 20):

- 16 are likely, probable or possible carcinogens;
- 13 are linked to birth defects;
- 15 are linked to reproductive problems;
- 22 are neurotoxins;
- 18 cause kidney or liver damage;
- 28 are irritants that can cause skin rashes, eye irritation, and other problems;
- 9 are known groundwater contaminants;
- 12 can leach through soil and are potential groundwater contaminants;
- 14 are toxic to birds;
- 30 are toxic to fish and other aquatic life; and,
- 16 are toxic to bees. (Bees play a critical role in plant reproduction.)

Least Hazardous Pesticide Use

Survey results reveal that many facilities have adopted the use of some pesticides that are less hazardous to human health and the environment. These include boric acid, bacillus thuringiensis (B.t.), and potassium salts of fatty acids (soaps). In fact, products containing boric acid as the active ingredient were the most commonly used pesticide products reported by the responding hospitals. Ten of the responding hospitals (45%) reported using one or more pesticide product containing boric acid. Boric acid, an inorganic chemical, is a non-volatile mineral with insecticidal, fungicidal, and herbicidal properties. Because of its extremely low volatility, it has long been embraced as a safer alternative to highly volatile synthetic chemical pesticides, as long as it is not mixed with solvents or other toxic inert ingredients.

Hospitals also reported the use of "natural" pesticides that are derived from plants or other non-synthetic sources. They are often characterized as having low toxicity, yet can still be quite hazardous. For example, seven hospitals (32%) reported the use of products containing pyrethrin, a nerve toxin derived from a member of the chrysanthemum plant family. Although this chemical is naturally derived and breaks down faster than pyrethroids and other synthetic pesticides, its use is still a cause of concern because of its high acute toxicity, allergenic potential, volatility, and possible ability to cause cancer in humans.[96] Also, pyrethrins are often formulated with toxic "synergistic" chemicals, including piperonyl butoxide, that pose their own risks.

Hospital Use of Cancelled Pesticide Products and Active Ingredients

From time to time, the registration of a pesticide or certain uses of the product are "cancelled" by EPA or withdrawn from use by the manufacturer. According to EPA, these cancellations occur for various reasons, such as:

- Voluntary cancellation by the registrant;
- Cancellation by EPA because required fees were not paid; or
- Cancellation by EPA because unacceptable risk existed that could not be reduced by other actions such as voluntary cancellation of selected uses or changes in the way the pesticide is used.[97]

Cancelled products are often phased-out over time, allowing individuals to use the products they have already purchased until existing stocks are depleted.

Although EPA does not maintain a list of cancelled pesticide products, a search through the California Department of Pesticide Regulation's Pesticide Product Database on the 159 pesticide products surveyed hospitals

reported using shows that some hospitals use products that have been cancelled. Eight hospitals (36%) reported using at least one cancelled pesticide product. A total of sixteen cancelled pesticide products were reported as being used by the eight hospitals. The dates these products were cancelled range from May 1987 to November 2001. Of these eight hospitals, one reported using four cancelled products.

While these cancellations are for the pesticide product and not for the product's active ingredient, the active ingredients bendiocarb, chlorpyrifos, and diazinon, all of which are reportedly used by the responding hospitals, are also being cancelled. In these cases, EPA and the pesticide registrants have agreed to phase out and cancel the use of these active ingredients in pesticide products for many non-agricultural uses because they pose unacceptable health risks.[99] While the use of products containing these active ingredients is legal while the phase outs take place, the risk associated with these pesticides should raise concerns for hospitals that reported their use. Four (18%) of the surveyed hospitals reported using eight products that contain bendiocarb, chlorpyrifos or diazinon.

FIGURE 16.
CANCELLED PESTICIDE PRODUCTS USED AT SURVEYED HOSPITALS[98]

Product Name	Date cancelled (month/year)	Active Ingredient	U.S. EPA Registration #
Borid Turbo	8/94	boric acid	9444-133
Ficam Dust	4/01	bendiocarb	45639-3 / 432-933
Ficam W	4/01	bendiocarb	45639-1 / 432-931
Microcare	11/92	ortho-benzyl-para-chlorophenol	1421-49
Pennant 5G	6/96	metachlor	100-665
Pennant Liquid Herbicide	7/01	metachlor	100-691
Malathion Premium Spray	7/97	malathion	904-153 / 10404-72
Precor 2000	7/01	methoprene, permethrin	2724-455
PT 1500 A Knox Out	7/01	diazinon	499-234
PT 265 A Knox Out	11/01	diazinon	499-228
PT 3-6-10 Aerocide	7/01	pyrethrins, piperonyl butoxide, n-octyl bicycloheptene, dicarbozimide, refined petroleum oil	499-221
PT 565	7/01	pyrethrins, piperonyl butoxide, n-octyl bicycloheptene, dicarbozimide, refined petroleum oil	499-182
Diazinon Spray	9/01	diazinon	802-444
Talon G Rodenticide Pellets	5/87	brodifacoum	10182-44
Talon G Weatherblok Bait	5/87	brodifacoum	0182-43
Vengeance Rodenticide Bait	7/99	bromethalin	432-748

Hospitals may be using cancelled products because: 1) the hospital or contractor is unaware of EPA's cancellation of the pesticide product, 2) there is inadequate record keeping of pesticide use, 3) the hospital or contractor have stockpiles of the product that they are using until existing stocks are depleted, and/or 4) the pesticide applicator is knowingly using a cancelled product because it is a "favorite tool." What is clear, however, is that federal and state agencies that regulate pesticides need to improve communication with hospitals regarding pesticide cancellations or restrictions. On the other hand, the individual that oversees the hospital pest management program, whether performed in-house or contracted out, is responsible for gathering appropriate information on the proposed pesticide before it is used and staying up-to-date on the regulatory status of pesticides already in use.

FIGURE 17.
HOSPITALS POSTING INDOOR PESTICIDE NOTIFICATION SIGNS

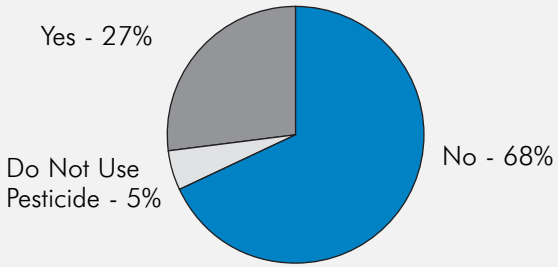
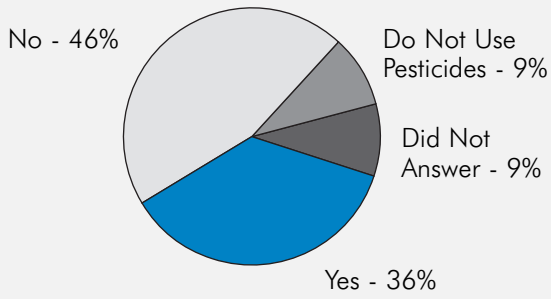


FIGURE 18.
HOSPITALS POSTING OUTDOOR PESTICIDE NOTIFICATION SIGNS



Hospital Pesticide Use Notification

Patients, staff, and the public have a right to be informed about the use of pesticides at health care facilities and their adverse effects. Providing notice to individuals prior to a pesticide application allows them to take precautions to avoid exposure to hazardous pesticides. Notification before, during, and after a pesticide application, is especially important for people who are most vulnerable to the harmful effects of pesticides, such as children, the elderly, those who already ill, and people who are chemically sensitive. Some of these individuals could be at risk of serious health effects just by walking on hospital grounds or into a hospital that has been treated with pesticides.

Six responding hospitals (27%) reported that they post notification signs when pesticides are used inside the hospital and eight hospitals (36%) post notification signs for outdoor pesticides. Comments provided by a few hospitals suggest that pesticide baits are exempted from some hospital's notification program or notification is considered unnecessary because baits and traps are the only products they use. One hospital (5%) reported it does not post signs for indoor pest management because pesticides are not used and two other hospitals (9%) do not post signs for outdoor pest management because pesticides are not used. Excluding those hospitals, only three hospitals (14%) post notification signs for both indoor and outdoor pesticide applications.

Some of the responding hospitals do provide other forms of pesticide notification to those in the hospital, although they usually only inform the hospital staff and not the patients or visitors. Eight hospitals (37%) provide other forms of notice for indoor pesticide applications and six hospitals (27%) provide other forms of notice for outdoor applications. Other types of notice include informing the contact person or supervisor in the treatment area, posting a notice on a bulletin board, providing verbal notice, or providing written notice through email or other form of distribution.

Record Keeping

Record keeping is an essential part of any pest management program. Records documenting the location, date, pest, and treatment strategy employed can be used to determine the effectiveness of pest treatments, potential sources of pest problems, and techniques for improving control and prevention efforts. Information on pesticides used can be helpful in understanding possible pesticide poisoning and in providing interested hospital occupants with information on previous pesticide applications.

The majority of hospitals responding to the survey keep records of the pesticides used at their facility. Seventeen of the responding hospitals (77%) keep records of structural pesticide applications and fourteen responding hospitals (64%) keep records of outdoor pesticide applications. Records are most often kept in the Environmental Services Department.

Twenty responding hospitals (91%) have copies on file of the MSDS for the pesticides it uses and make these available to hospital staff. A MSDS provides information on some of the hazards of the product (usually only the active ingredient) as well as makes suggestions for safety precautions that should be taken when applying, handling or storing the pesticide. Although the Occupational Safety and Health Administration (OSHA) requires product manufacturers to provide MSDSs on their pesticide products, the information is limited by the fact that the manufacturer completes them.[100]

Staff Training on Pesticide Health Effects

Training of hospital staff on the health effects of pesticides is essential so staff can recognize pesticide-poisoning symptoms and make informed choices about exposure. The survey results show that only six hospitals (27%) provide training to their staff on the health effects of pesticides. In some cases only a subset of the hospital staff are trained, according to the returned surveys.

Cost of Hospital Pest Management

Cost is an important factor for hospitals when choosing a pest management strategy. A pest management program that utilizes the IPM approach is more cost-effective than a conventional pesticide-intensive pest management program.[101]

The annual costs for the responding hospitals' pest management services range from $4,800 for an outpatient-only facility to $150,000 for an 898-bed facility. The 898-bed facility's pest management cost is more than three times the second and third most expensive pest management programs, which are $36,761 for a 998-bed hospital and $35,000 for an 850-bed hospital. The costs provided by the thirteen responding hospitals average $26,703 annually per hospital (or $16,429 annually per hospital if the cost reported by the 898-bed facility is excluded). Using the available data, the average annual cost of pest management for the responding hospitals is $55 per bed annually (or $37 per bed annually if the cost reported by the 898-bed facility is excluded).

FIGURE 19.
COST OF HOSPITAL PEST MANAGEMENT

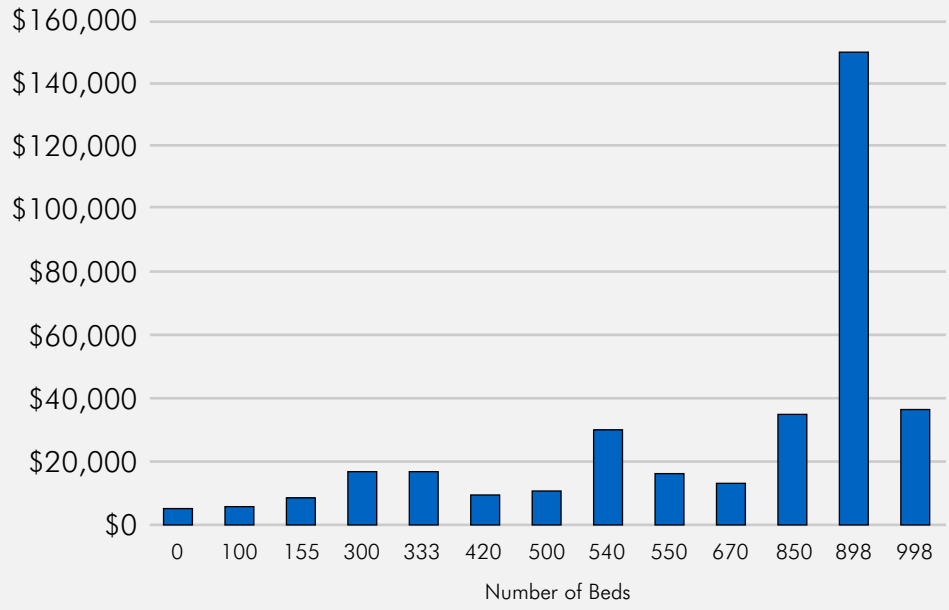


FIGURE 20. HEALTH EFFECTS OF 37 PESTICIDE ACTIVE INGREDIENTS MOST COMMONLY USED AT SURVEYED HOSPITALS (1 OF 2)

Active Ingredient	Cancer	Birth Defects	Reproductive Effects	Neurotoxin	Kidney/Liver Damage	Sensitizer/ Irritant
Insecticide						
Acephate	C[1]		X[2]	X[2]		X[2]
Abamectin		X[2]	X[2]	X[2]		X[2]
Bendiocarb		X[3]		X[2]		X[2]
Bifenthrin	C[1]	X[3]		X[2]		
Boric Acid*			X[4]			X[4]
Carbaryl	C[1]	X[7]	X[9]	X[2]		X[2]
Cyfluthrin			X[2]	X[2]	X[2]	X[2]
Cypermethrin	C[1]			X[2]	X[2]	X[2]
Deltamethrin			X[2]	X[2]		X[2]
Diazinon		X[3]		X[2]		X[2]
Fipronil	C[1]		X[5]		X[5]	X[5]
Hydramethylnon	C[1]	X[6]	X[2]		X[2]	X[2]
Hydroprene	D[1]				X[5]	
Lambda-Cyhalothrin	D[1]			X[5]		X[5]
Malathion	Suggestive[1]		X[7]	X[2]	X[2]	X[5]
n-octyl bicycloheptene dicarboximide (synergist)	C[1]			X[8]		
Permethrin	C[1]		X[9]	X[2]	X[2]	X[2]
Piperonyl Butoxide (synergist)	C[1]				X[5]	X[5]
Potassium Laurate (soap)						X[5]
Propoxur	B2[1]	X[2]		X[2]	X[2]	
Pyrethrins	Likely[1]			X[2]	X[2]	X[2]
Silica Gel						
Sulfluramid			X[10]			
Herbicide						
Bentazon		X[4]		X[2]		X[2]
2,4-D	2B[11]	X[7]	X[7]	X[12]	X[2]	X[11]
Dicamba	D[1]	X[3]		X[2]	X[2]	X[2]
Glyphosate			X[7]			X[4]

FIGURE 20. HEALTH EFFECTS OF 37 PESTICIDE ACTIVE INGREDIENTS MOST COMMONLY USED AT SURVEYED HOSPITALS (2 OF 2)

Active Ingredient	Cancer	Birth Defects	Reproductive Effects	Neurotoxin	Kidney/Liver Damage	Sensitizer/ Irritant
Mecoprop	2B[11]	X[2]			X[2]	X[2]
Metolachlor	C[1]	X[4]				X[8]
MSMA	X[13]		X[8]	X[8]		X[8]
Picloram					X[2]	X[2]
Prodiamine	C[1]					
Triclopyr	D[1]				X[2]	X[2]
Rodenticide						
Brodifacoum				X[8]	X[8]	
Bromadiolone				X[8]	X[8]	
Diphacinone		X[8]		X[8]	X[8]	X[8]
Fungicide						
Mancozeb	B2[1]		X[14]			X[2]
TOTAL	16 (likely, probable or possible)	13	15	22	18	28

X = Adverse effect demonstrated, see footnote.
B2 = U.S. EPA weight-of evidence category, "probable human carcinogen, sufficient evidence in animals and inadequate or no evidence in humans."
2B = International Agency for Research on Cancer category, World Health Organization (IARC), the agent (mixture) is possibly carcinogenic to humans.
C = U.S. EPA weight-of-evidence category, "possible human carcinogen" rating.
D = U.S. EPA weight-of-evidence category, "not classifiable as to human carcinogenicity," usually due to inadequate data.
Likely = "Likely to be a human carcinogen."
Suggestive = Suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential.
* For the purposes of this table, boric acid includes borax, disodium octobrate tetrahydrate, and orthoboric acid.

Notes

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13. MSMA contains arsenic. IARC lists arsenic and arsenic compounds as known carcinogens. <http://193.51.164.11/monoeval/crtgr01.html>.
14. U.S. EPA 2002. Handbook for Non-Cancer Health Effects Valuation, Appendix C Case Studies, Economic Valuation of Endocrine Disruption: Introduction. Science Policy Council. <www.epa.gov/osp/spc/Endoqs.htm>.

FIGURE 21. ECOLOGICAL EFFECTS OF 37 PESTICIDE ACTIVE INGREDIENTS MOST COMMONLY USED AT SURVEYED HOSPITALS (1OF 2)

Active Ingredient	Detected in Groundwater	Potential Leacher	Toxic to Birds	Toxic to Fish/ Aquatic Organisms	Toxic to Bees
Insecticide					
Acephate			X[1]		X[1]
Abamectin				X[1]	X[1]
Bendiocarb			X[1]	X[1]	X[1]
Bifenthrin			X[1]	X[1]	X[1]
Boric Acid*					
Carbaryl	X[1]			X[1]	X[1]
Cyfluthrin				X[1]	X[1]
Cypermethrin				X[1]	X[1]
Deltamethrin				X[1]	X[1]
Diazinon	X[1]	X[2]	X[1]	X[1]	X[1]
Fipronil			X[2]	X[2]	X[2]
Hydramethylnon				X[1]	
Hydroprene				X[2]	
Lambda-Cyhalothrin				X[1]	X[1]
Malathion	X[1]	X[1]	X[1]	X[1]	X[1]
n-octyl bicycloheptene dicarboximide (synergist)				X[4]	
Permethrin				X[1]	X[1]
Piperonyl Butoxide (synergist)		X[2]		X[2]	
Potassium Laurate (soap)				X[2]	
Propoxur	X[1]	X[1]	X[1]	X[1]	X[1]
Pyrethrins				X[1]	X[1]
Silica Gel					
Sulfluramid				X[4]	
Herbicide					
Bentazon	X[1]	X[1]	X[1]	X[1]	
2,4-D	X[1]	X[2]	X[1]	X[1]	X[1]
Dicamba	X[1]	X[1]			
Glyphosate			X[1]	X[1]	
Mecoprop		X[1]			

FIGURE 21. ECOLOGICAL EFFECTS OF 37 PESTICIDE ACTIVE INGREDIENTS MOST COMMONLY USED AT SURVEYED HOSPITALS (2 OF 2)

Active Ingredient	Detected in Groundwater	Potential Leacher	Toxic to Birds	Toxic to Fish/ Aquatic Organisms	Toxic to Bees
Metolachlor	X[5]	X[5]		X[5]	
MSMA		X[6]			
Picloram	X[1]	X[1]		X[1]	
Prodiamine					
Triclopyr		X[1]		X[5]	
Rodenticide					
Brodifacoum			X[5]	X[5]	
Bromadiolone			X[5]	X[5]	
Diphacinone			X[5]	X[5]	
Fungicide					
Mancozeb			X[1]	X[1]	
TOTAL	9	12	14	30	16

X = Adverse effect demonstrated, see footnote.
* For the purposes of this table, boric acid includes borax, disodium octobrate tetrahydrate, and orthoboric acid.

Notes

1. Extension Toxicology Network. Pesticide Information Profiles. Oregon State University and U.S. EPA. <http://ace.orst.edu/info/extoxnet/pips/ghindex.html>.
2. Agency for Toxic Substances and Disease Registry (ATSDR). 2003. ToxFAQs. <http://www.atsdr.cdc.gov/toxfaq.html>.
3. National Pesticide Information Center. Pesticide Fact Sheets. Oregon State University. <http://ace.orst.edu/info/npic/npicfact.htm>.
4. U.S. EPA. 2000. Environmental Effects Database. Environmental Fate and Effects Division. Office of Pesticide Programs. Washington, DC cited in Orne, S., et al. 2002. Pesticide Action Network Pesticide Database. Pesticide Action Network North America. San Francisco, CA. <http://www.pesticideinfo.org>.
5. U.S. EPA. Reregistration Eligibility Decision (RED) Fact Sheets. Office of Pesticide Programs. <http://www.epa.gov/pesticides/reregistration/status.htm>.
6. National Library of Medicine. TOXNET. Hazardous Substances Database. <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>.

III. Safer Pest Management Practices

Many hospital occupants are especially vulnerable to pesticides yet pests are unacceptable in such an environment. Therefore, it is vital that the hospital employ a pest management program that effectively prevents and controls pest problems using the least hazardous approach. As required by the Centers for Medicare and Medicaid Services (CMS) of the Department of Health and Human Services, "hospital must be … maintained to ensure the safety of the patient."[102]

Like other public buildings, hospitals experience their share of pest problems ranging from mice, ants, flies, and spiders inside facilities to weeds and other insects on hospital grounds. Although many pests are only nuisances, some pests like flies, cockroaches, yellowjackets, rodents, and termites have the potential to cause harm by spreading disease, triggering allergies or asthma attacks, causing painful stings which can be life-threatening to those with allergies, contaminating food, or causing structural damage.

Pest problems usually signal larger problems with a health care facility's sanitation, maintenance, and soil health. Pests are attracted by improperly stored food, waste scraps, food gifts, and water sources. Frequent sites of pest infestations include hospital cafeterias, loading docks, storage areas, bathrooms, waste disposal areas, and patient rooms, especially in long-term care facilities. Pests most frequently enter a hospital through open or leaky doors (exacerbated by typically heavy foot traffic in and out of hospital facilities), windows, wall, ceiling, and floor cracks, and gaps around plumbing and other pipes that enter the building. They can also enter a hospital by hitchhiking a ride in cardboard boxes, suitcases, and flowers, among other things. According to IPM expert Gary Alpert, a major pest problem for hospitals in Massachusetts is the American cockroach which often results from broken sewer lines, dried up floor drains, and water traps that need repair. On hospital grounds, unhealthy lawns and landscape and/or poor soil conditions foster weed growth and insect infestations.

But the solution to a pest problem must not be more harmful than the pest problem it is meant to solve. In typical pesticide spray programs it is not unusual to overestimate the risk of the pest and underestimate the risk of the pesticide. For example, many pests like common house spiders may be a nuisance but are not harmful. Most pesticides however, are associated with a variety of health risks. The American Medical Association's Council on Scientific Affairs states, "Particular uncertainty exists regarding the long-term health effects of low dose pesticide exposure. Current surveillance systems are inadequate to characterize potential exposure problems related either to pesticide usage or pesticide-related illnesses. Considering these data gaps, it is prudent for homeowners, farmers, and workers to limit pesticides exposures to themselves and others, and to use the least toxic chemical pesticide or nonchemical alternative."[103]

Fortunately there is a method of pest control called IPM that can control pests without the use of toxic pesticides. Cities, counties, government agencies, and schools nationwide are increasingly adopting IPM programs. The General Services Administration has had a structural IPM program since 1989 and the National Park Service has had a structural and outdoor IPM program since the early 1980's.[104] The City of San Francisco adopted an IPM ordinance in 1996. The City of Santa Fe adopted an IPM ordinance in 2001 and has almost completely eliminated its use of toxic pesticides.

Washington, Oregon, Michigan, and Connecticut have all passed laws that require state agencies to adopt an IPM program at the facilities under their control. Washington and Oregon statutes are similar, requiring every person responsible for pest management in each agency to be trained in IPM. These laws establish an Interagency IPM Coordinating Committee consisting of an IPM representative from each agency and require the Committee meetings be open to the public.[105]

Perhaps the greatest increase in IPM programs is occurring in schools, which like hospitals have a special obligation to protect their vulnerable occupants from toxic exposures. The three largest school districts in the continental U.S., New York Public Schools, Los Angeles Unified School District, and Chicago Public Schools, are successfully implementing IPM programs that have significantly reduced the amount of pesticides used, decreased the number of pest problems, and have kept costs at or lower than a conventional pest program. And as the hospital survey shows, IPM is also being practiced in some U.S. hospitals.

FIGURE 22.
HEALTH CARE COMMUNITY SUPPORTS IPM

American Hospital Association Certification Center, a division of the American Hospital Association (AHA), has developed a certification program for Certified Healthcare Environmental Services Professionals. The examination includes sanitation issues and requires the candidate "… to possess an understanding of pest control, develop and administer an integrated pest management program, … [and] develop a process for monitoring and evaluating contracted services for … pest control …"[106]

American Society for Healthcare Environmental Services (ASHES) of AHA, has published a document entitled, *Integrated Pest Management,* for their Professional Development Series, which provides general information on IPM for health care facilities. The document addresses issues regarding IPM versus traditional pest control, client expectations, IPM implementation, and pesticide use and storage, while emphasizing "a hierarchical approach, with actual pesticide application[s] being the last accommodation."[107]

American Society for Healthcare Engineering (ASHE) of AHA has developed a Sustainable Design Award. As part of the recognition program, ASHE has developed guidelines for hospitals, which include the recommendation to use IPM practices.[108]

Hospitals for a Healthy Environment (H2E) is a joint project of the American Hospital Association, EPA, Health Care Without Harm, and the American Nurses Association. The goal of H2E is to educate health care professionals about pollution prevention opportunities in hospitals and health care systems. This includes the adoption of IPM. The H2E website states that "Health care facilities must control pest problems, but many pesticides can expose patients, staff, visitors, and the community to hazardous chemicals that might cause allergic reactions, irritation, neurotoxic effects, hypersensitivity, and cancer. IPM uses a combination of methods to control pests while minimizing the potential adverse health effects."[109]

Hospital IPM Expert, Gary Alpert, who has a doctorate in entomology, is an environmental biologist at Harvard University's Environmental Health and Safety Department. For 20 years he was responsible for ten major hospital facilities in the Boston area. Although he never used an organophosphate or carbamate pesticide, he achieved 100% pest control and client satisfaction with his program. It is critical, says Alpert, that the hospital's policy be put in the pest control bid specifications. This becomes a tool for getting a good contract. Alpert agrees that IPM is not just a safer approach to pest management but is also more effective. Once preventive measures are firmly in place, IPM uses less time to manage pests than conventional pest control. [110]

FIGURE 23. INTEGRATED PEST MANAGEMENT (IPM) DEFINED

IPM is an approach to pest management that focuses on preventing and managing pest problems both inside and outside a hospital facility through non-toxic methods such as good sanitation practices, structural maintenance, mechanical and biological controls, and cultural practices. Only after non-toxic options have been tried or have no chance of working, may a least hazardous pesticide be used.

Least hazardous pest management materials include boric acid and disodium octoborate tetrahydrate; diatomaceous earth; nonvolatile insect and rodent baits in tamper-resistant containers or for crack and crevice treatment only; microbe-based insecticides; botanical insecticides that do not contain synthetic pyrethroids or toxic synergists; biological control agents, such as parasites and predators; soap-based products; use of liquid nitrogen for cold treatments; and exempt natural pesticides, like corn gluten meal, that are listed under section 25(b) of the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA). <www.epa.gov/pesticides/biopesticides/regtools/25b_list.html>

A model IPM program prohibits the following (except when a pest problem poses an urgent threat to health):

- The use of the most dangerous pesticides:
  - (a) Pesticides in U.S. EPA Categories I and II (i.e., those with highest acute toxicity);
  - (b) Pesticides linked to cancer — U.S. EPA Class A, B, C carcinogens <www.epa.gov/pesticides/carlist/index.html> and chemicals known to the state of California to cause cancer under Proposition 65 <www.oehha.org/prop65/prop65_list/Newlist.html>;
  - (c) Pesticides that interfere with human hormones and/or cause birth defects or reproductive or developmental harm, e.g., those identified as reproductive or developmental toxins or suspected endocrine disruptors <www.pesticideinfo.org> or chemicals known to California to be reproductive toxins under Proposition 65 <www.oehha.org/prop65/prop65_list/Newlist.html>;
  - (d) Pesticides in the carbamate (carbaryl, bendiocarb, etc.), organophosphate (diazinon, acephate, etc.) or pyrethroid (cyfluthrin, permethrin, etc.) chemical family and phenoxy herbicides (2,4-D, mecoprop, etc.); and,
  - (e) Pesticide products that contain inert ingredients categorized by the U.S. EPA as "List 1: Inerts of Toxicological Concern" (dioctyl phthalate, formaldehyde, hydroquinone, isophorone, nonylphenol, phenol, and rhodamine B)
- Pest management decisions based on aesthetics alone.
- The application of pesticides on a routine basis, whether pests are present or not.
- The application of pesticides while the area is occupied or may become occupied during the 24 hours following the application.
- The application of pesticides by fogging, bombs, or tenting or by space, broadcast, or baseboard spraying.

Integrated Pest Management (IPM): A Safer Solution

IPM is a program of prevention, monitoring, and control that eliminates or drastically reduces the use of pesticides, and that minimizes the toxicity of and exposure to any products that are used. This approach focuses on long-term prevention or suppression of pest problems through a combination of techniques such as regular pest population monitoring, site or pest inspections, and structural, mechanical, cultural, and biological controls. Techniques can include such methods as improving sanitation, making structural repairs, pest-proofing waste disposal, establishing good soil health, and other nonchemical tactics.

Where preventive approaches fail, the adoption of additional tactics including mechanical traps, vacuuming, biological controls, and habitat modification can significantly improve the safety and effectiveness of a pest management program. Least hazardous pesticides are used only as a last resort. Hazardous pesticides are rarely if ever applied. Public notification is provided if any pesticide is used. The IPM approach uses knowledge of a pest's biology and habitat needs to time specific least hazardous interventions to prevent and control pests.

Hospitals deciding to use an IPM program should adopt a written IPM policy that clearly specifies the program's goals and establishes a process for decision-making. This will help ensure the program's implementation success and longevity. An IPM policy gives facility managers and commercial pest control contractors guidance on how to prevent and manage pest problems in the least hazardous manner possible.

It is important to involve staff from various hospital departments in the creation and implementation of the IPM program, including legal and risk management staff, administrators, custodians, maintenance personnel, and cafeteria staff. Medical oversight should also be provided to ensure that the health needs of patients and employees are protected. An IPM coordinator should be designated to manage or oversee the IPM program. The most appropriate person to be the IPM coordinator is usually the current staff person in charge of the hospital's pest control (often the environmental services manager) and/or the person in charge of grounds and maintenance. The coordinator's job should include supervising staff in managing pests, doing the work himself or herself, and/or overseeing a contractor's work. In any case, decisions about a hospital's pest management are best done by a knowledgeable person who does not have a financial interest in selling a pesticide product or service. The IPM coordinator should also determine the needs of the various areas of the hospital and set "action thresholds," or pest population levels that require remedial action for human health or economic reasons.

Hospital administrators and the IPM coordinator should be aware that while true IPM uses few or no pesticides, some pest control companies call their traditional pesticide spray programs IPM. The main difference in IPM programs comes down to the emphasis on chemical controls. Therefore, prior to hiring a company, it is important to evaluate the details of its IPM program to determine whether it conforms to the criteria discussed in this report and the hospital's IPM policy. Monthly or other regular pesticide spraying, even if it is a crack and crevice application, is not IPM.

Key Elements of an IPM Program

Education

Education, in the form of workshops, training sessions, and written materials, is an essential component of an IPM program. It takes cooperation and resource sharing between several hospital departments to get the necessary training to the appropriate staff. All hospital occupants, including administrators, cafeteria staff, doctors, nurses, patients, volunteers, and visitors should be informed about the advantages of IPM and the hazards of pesticides. Educational programs should emphasize the need for hospital occupants to monitor and report pest problems and reactions to pest control products, and stress the importance of properly sealing food containers, minimizing dispersion of crumbs, and appropriately disposing of food waste.

Monitoring

Regular site inspections and pest trappings (e.g., with mousetraps or glue boards) help determine whether pests are present and whether they are present at a level that requires control measures. Monitoring can also help establish possible causes of a pest problem (such as leaky pipes, food crumbs, cracks in the walls, or drought-stressed plants) and the outcomes of control measures used. Monitoring is critical to reducing pest management costs because it helps pest managers target their intervention to only those areas where pest populations are present at a level that warrants action.

Pest Prevention

Non-chemical prevention is the primary means of pest management in an IPM program. Key elements include habitat modification that reduces or eliminates sources of food, water, shelter, and entryways for pests as well as the maintenance of healthy lawns and landscapes. Taking preventative measures as simple as thoroughly cleaning food storage areas, caulking cracks, daily removal of waste to dumpsters, educating hospital staff and occupants about the importance of proper waste disposal, spreading mulch to combat weeds, landscaping with pest- and drought-resistant plants, using weed-free seed, and installing rat-proof waste compactors can markedly reduce pest problems.

Buildings should be designed to be as pest resistant as possible by:

- Caulking cracks and gaps in the building to block pest entry;
- Using door sweeps and screens;
- Grading away from the building to prevent water pooling that fosters mold growth;
- Landscaping with indigenous vegetation that is naturally pest resistant;
- Avoiding indoor plantings that foster mold growth and can be attractants for pests; and,
- Keeping vegetation away from buildings to reduce mold growth and pests' access to the building.

FIGURE 24. EXAMPLES OF SAFER PEST MANAGEMENT FOR HOSPITAL PESTS*[111]

PEST	TYPICAL LOCATIONS	PESTICIDES COMMONLY USED	SAFER ALTERNATIVE	COMMENTS
Common Flies	Dumpster areas, exterior waste containers, inside building entrances	Permethrin and other Pyrethroids, Diazinon, Propoxur, Chlorpyrifos	Sanitation, exclusion, flypaper, fly swatters, UV light traps indoors, traps with non-toxic attractants outdoors.	Fly problems often caused by rotting food, source removal is essential. Secure garbage in tightly wrapped plastic bags. Secure window screens. Place UV light traps 3 to 6 feet from floor near entryways. Do not use zapper types, which explode flies.
Fruit Flies	Food storage, preparation & consumption areas	Permethrin and other Pyrethroids, Diazinon, Propoxur, Chlorpyrifos	Sanitation, including cleaning floor drains frequently, UV light traps, work with food service to minimize fruit storage.	Common problem around fruit storage/consumption. Mitigate by frequent vacuuming of flies. Put food waste in tightly sealed containers and empty frequently.
Cockroaches (½" German)	Food storage, preparation & consumption areas; loading docks & storerooms	Cyfluthrin and other Pyrethroids, Chlorpyrifos, Bendiocarb, Diazinon, Hydroprene, Acephate, Propoxur	Sanitation, food stored in pest-proof airtight containers, eliminate corrugated cardboard by removing supplies from boxes prior to entry into facility; eliminate moisture sources; block entry points; vacuum, use glueboards, pheromone traps, or least-hazardous least-volatile baits and gels (such as boric acid) if necessary.	Most important is to remove food and water source. Fix leaks, install door sweeps, caulk cracks, and eliminate clutter. German cockroaches are very visible, especially after activating lighting. Sensitive public relations issue, communicate with staff and engage in rectifying source problems.
Cockroaches (1½" American)	Steam tunnels, sewers, boiler rooms & other warm, moist environments	Cyfluthrin and other Pyrethroids, Chlorpyrifos, Bendiocarb, Diazinon, Hydroprene, Acephate, Propoxur	Locate/eliminate nest, eliminate moisture; use glueboards, or least hazardous least-volatile baits and gels (such as boric acid) if necessary.	American roaches stay in defined area and are less visible until environment/nest is disturbed.
Ants (indoors)	Concrete floor areas	Cyfluthrin and other Pyrethroids, Bendiocarb, Chlorpyrifos, Diazinon, Propoxur	Sanitation, eliminate food and moisture sources, seal cracks/crevices, install door sweeps; vacuum, spray or wipe trail with soapy water, use baits specific for ant type.	Identify specific ant type to determine most effective control measures.
Rodents (mice, rats)	Loading docks, dumpster areas, food storage & preparation areas	Anticoagulant dusts or baits	Sanitation, eliminate access to food and moisture; use well-sealed self-contained waste compactors and mechanical barriers (install door sweeps, pack openings with copper mesh or stainless steel wool in cracks/crevices), eliminate clutter/ harborage areas (including keeping plantings away from exterior walls); sprinkle ground cayenne pepper at entry points; snap traps.	Mice are managed, but rarely eliminated in large buildings, regardless of the type of control method(s) used. Encourage supplier warehouses (especially of office supplies) to have IPM programs to reduce chance of mice infestations in their delivered goods. Rats are likewise managed. It is critical to prevent access to interior where infestation is most difficult to address. Sensitive public relations issue, communicate with and engage staff in rectifying source problems.
Weeds and Other Landscape Pests (insects, fungus)	Lawns, gardens, trees	2,4-D, Dicamba, Mecoprop, Carbaryl, Malathion, Dimethoate, Ethion, Sulfur, Disulfoton	Maintain lawn health, pull or cut weeds, apply corn gluten meal to lawns and/or mulch planting beds to suppress weeds, physically remove insect pests or knock off with hard stream of water, spray plants with soapy water, use beneficial, predatory, or natural enemy organisms.	Healthy soil, lawn, and landscape plants are the best weed and pest prevention. Raise mowing height to 3½ to 4 inches, water only when turf starts to lose turgor. Beneficial insects include predatory mites, green lacewing, and ladybird beetles.

*These are examples only. Optimal pest management decisions will vary from facility to facility based on individual needs and resources.

FIGURE 25.
NON-TOXIC LANDSCAPE AND GROUNDS MANAGEMENT[112]

Non-chemical control options include using a high-pressure water system to remove insects from plants, a hot water weed control system, flame weeders, manual/physical removal of insects and weeds, mechanical cultivation, mulches to suppress weeds, competitive vegetation to outgrow weeds, and landscape renovation to increase the number of native and/or pest-resistant species and arrange plantings to maximize their health.

Cultural control options include using weed-free topsoil and soil amendments, pest and weed resistant varieties of plant materials, soil tests to guide appropriate soil pH and nutrient content, proper pruning and mowing techniques (e.g. mowing dry grass with sharpened blade set as high as possible), proper water drainage and irrigation, proper plant selection for the proposed location, and tolerance of weeds.

Biological control options include both natural and introduced pest predators and parasites, microbe-based insecticides, botanical insecticides that do not contain synthetic pyrethroids or toxic synergists, and enzymes.

Least Hazardous Approach to Pests

The first approach to controlling a pest outbreak should be to improve sanitation, make structural repairs, and use physical and mechanical controls such as screens, traps, vacuuming and motorized weeders. The least hazardous chemical control strategy should be chosen only when a mixture of other strategies is shown to be inadequate. The risks associated with the use of a pesticide need to be weighed against the problem caused by the pest. Control options should be considered carefully, being mindful not to blindly jump at a solution that may have risks - without first collecting the facts. Information about the toxicity of a pesticide can be found on its label and material safety data sheet (MSDS), in scientific articles, and fact sheets prepared by various government and non-profit organizations (See Resources List in Appendix).

Least hazardous pest management materials include boric acid and disodium octoborate tetrahydrate; diatomaceous earth; nonvolatile insect and rodent baits in tamper-resistant containers or for crack and crevice treatment only; microbe-based insecticides; botanical insecticides that do not contain synthetic pyrethroids or toxic synergists; biological control agents, such as parasites and predators; soap-based products; use of liquid nitrogen for cold treatments; silica gels; and exempt natural pesticides, like corn gluten meal, that are listed under section 25(b) of the *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA).

While the above materials are less hazardous than conventional pesticides, they still have the potential to cause harm to human health and the environment, especially to chemically sensitive, asthmatic, or allergic individuals. They are, however, generally less volatile than con-

FIGURE 26.
OVERVIEW OF SELECT LEAST HAZARDOUS PESTICIDES

Boric Acid. Boric acid is a naturally occurring non-volatile mineral with insecticidal, fungicidal, and herbicidal properties. It comes in different formulations including baits, sprays, gels, and dusts. Boric acid is an effective ant and cockroach stomach poison. It has long been embraced as a safer alternative to highly volatile and more toxic synthetic chemical pesticides. While exposure to boric acid can cause adverse health effects, these problems can be avoided by using boric acid bait stations. Boric acid baits, dusts, or gels should only be applied in areas where they will not come in contact with people, e.g. in cracks and crevices, behind counters, and in wall voids. While boric acid is somewhat slower acting than more hazardous pesticides, it is more effective in the long run.

Insecticidal and Herbicidal Soaps. Insecticidal and herbicidal soaps contain sodium or potassium hydroxides of fatty acids, which are usually combined with vegetable oil. (Be aware that some soaps are combined with petroleum products and/or other toxic active ingredients or synergists and should be avoided.) Fatty-acid soaps are virtually non-toxic to humans or mammals unless they are ingested. When fatty-acid soap touches the outer body, or cuticle, of an insect or plant tissue it leads to dehydration and eventual death of the pest. These soaps rapidly biodegrade in soil. Because fatty-acid insecticidal soaps can kill beneficial as well as pest insects, outdoor use should be limited to spot treatments.[113]

Bacillus thuringiensis. *Bacillus thuringiensis* (B.t.) is a naturally occurring soil bacterium. It is a spore-forming rod and an insect pathogen. There are nearly 400 registered B.t. products in this country, providing effective control of such major insect pests as gypsy moths, mosquitoes, black flies, and many others. Since B.t. must be ingested to be effective, it only works against insects in their larval feeding stages. Once enough B.t. is ingested, insect larva soon stop feeding and die within a few days to weeks. B.t. is completely biodegradable, has a short half-life, and does not persist in the digestive systems of birds or mammals. While the health risks of B.t. are generally minimal, one recent study suggests the possibility that exposure to B.t. may lead to allergic skin sensitization in some farmworkers.[114]

FIGURE 27.
BAITS: THE BETTER OPTION

Baits are most successful at controlling social insects like ants, termites, wasps, and bees. Baits contain insect or rodent poisons mixed with food or other attractants that the pest will take back to the hive or colony and share with the others including the larvae and the queen.[115] A bait containing a non-volatizing pesticide like boric acid, is just as, if not more, effective in controlling these types of pest populations as spraying toxic pesticides, and does not pose the high risk for human exposure. Other chemicals, like pyrethroids, carbamates, and organophosphates, are less hazardous if used in baits rather than as sprays, but still pose a risk to human health and the environment.

In general, baits are a better choice for pest control than spraying pesticides because they target specific pest populations, use much less pesticides, and volatize little or no pesticide ingredients into the air. It is, however, extremely important that baits be in tamper-resistant containers, only used for crack and crevice treatments or placed in other inaccessible locations, and be out of the reach of children.

ventional pesticides, so have less ability to vaporize or volatize into the air. These materials, like other pesticides, are the least hazardous when used in bait stations rather than as spray or dust applications.

Pesticide Use Notification

Hazardous pesticides are rarely, if ever, used in a true IPM program. But in those cases where they are used, patients, staff, and the public have a right to be informed. Notification of pesticide applications before, during, and after the application provides hospital staff, patients, and the public with the opportunity to take precautions to avoid or minimize exposure to them. Notification is especially important, even for spot treatments, for people who are sensitive to chemicals because they can become extremely ill from exposures to very low levels of pesticides.

As of September 2003, laws in Illinois, Maine, Massachusetts, New Jersey, and Texas, already require pesticide use notification be provided for certain types of pesticide applications made in health care facilities in those states. California and Delaware require information regarding an application in a health care facility be available upon request.[116] Twenty states require commercial applicators to post notification signs when pesticides are applied to lawns. (see Figure 29). Because state laws on pesticide use and notification are changing with variations in each state, it is important to check state and local laws for the specific requirements.

Record Keeping

Records of pests, treatments (including the use of any pesticides) and outcomes should be kept for a minimum of 7 years and longer if feasible. A record keeping system can help establish trends and patterns in pest outbreaks, especially if they are weather dependent and only recur

FIGURE 28.
MODEL NOTIFICATION PROGRAM

When pesticides are used, with the exception of clear emergency situations, hospitals should:

- Provide written notification to all staff and patients 72 hours in advance of a pesticide application;
- Pre-notify abutting property owners, if a pesticide application will be made on the hospital's lawn or landscape; and,
- Post notification signs at the entrance to and immediately adjacent to the site of an expected pesticide application 72 hours in advance of the application and leave them in place for 72 hours after the application.

In the case of emergencies, signs should be posted at the commencement of the pesticide application and remain posted for 72 hours afterwards.

Written notification and posted notification signs should contain the following information:

- Time/date of application;
- Application site;
- Name of pesticide product, active ingredient and EPA registration number;
- Possible health effects listed on the pesticide product label or Material Safety Data Sheet (MSDS);
- Application method;
- Target pest and reason for the pesticide application;
- Applicator name and company; and,
- Name and phone number of whom to contact for additional information.

Hospitals should also provide the phone number and email address of a contact person, ideally the IPM coordinator, who is able to answer questions and provide additional information about the hospital's pesticide use, including past and proposed applications.

FIGURE 29. STATES WITH LAWN NOTIFICATION REQUIREMENTS

Concerns over potential human exposure to pesticides have led some states to pass laws that warn people of a lawn pesticide application by posting notification signs, establishing registries or providing prior notification to abutting property owners. State notification laws usually state where, when, and what pesticide has been or will be applied and by whom. As of September 2003, twenty states require commercial applicators to post notification signs when a pesticide is applied to a lawn. Most states require that notification signs be posted in a conspicuous point of access to the treated property and left in place for 24 hours. Warning signs vary in language but usually state, "Lawn Care Application: Keep off the Grass."[117]

Colorado	Indiana	Massachusetts	Ohio
Connecticut	Iowa	Michigan	Rhode Island
Florida	Kentucky	New Hampshire	Vermont
Georgia	Maine	New Jersey	Washington
Illinois	Maryland	New York	Wisconsin

periodically. Information recorded at every inspection or treatment should include the identification of the pest, population size, distribution, recommendations for future prevention, and complete information on the treatment action. Regular evaluation of the IPM program will help determine acceptable pest population levels and effective reduction measures.

IPM is Cost Effective

Adopting an IPM approach to pest management is just as cost-effective as, if not more than, a conventional pesticide intensive program. Because IPM focuses on prevention of pest problems, and proper monitoring to determine the extent of pest problems, IPM programs can decrease the amount of money spent on pest control in the long-term. While there are often some additional startup costs for an IPM program, the savings from decreased maintenance costs over time often add up to overall savings. Chemical-intensive methods, a symptomatic approach to managing pest problems, may only prove to be less expensive in the short-term.

According to the New York Attorney General's report on New York State Hospital Pest Management, IPM "will reduce pesticide exposures to patients and to hospital staffers and thus protect health. Additionally, adoption of [IPM] will save money. Pesticides are not cheap. Any approaches that sensibly reduce their use will help to contain hospital costs."[118]

The EPA agrees, "IPM can reduce the use of chemicals and provide economical and effective pest suppression."[119]

Activities that can be absorbed into a hospital's existing budget include training of maintenance, cleaning, and food service staff and educating staff, patients and visitors to modify their behavior. In addition, some hospital maintenance and structural repair funds may already be budgeted for activities such as replacing water-damaged materials, landscaping, waste management, and constructing physical barriers.

Examples of the cost effectiveness of IPM:

- The General Services Administration (GSA) has successfully implemented an IPM program for over a decade in its 30-million square feet of office space (approximately 7,000 federal buildings). The program relies on portable vacuums rather than pesticide sprays for initial pest cleanouts and uses trapping devices rather than pesticide sprays for indoor fly control wherever appropriate. Albert Greene, Ph.D., National IPM Coordinator GSA, states that IPM "can be pragmatic, economical, and effective on a massive scale."[120]
- Similarly, an IPM program at the University of Rochester resulted in a 50 percent reduction in material costs and a substantial reduction in personnel costs.[121]
- The City of Santa Monica, California, has reduced its pest control costs by 30 percent, while achieving excellent control of rats, mice, cockroaches, and ants in and around city-owned structures.[122]
- Before Monroe County Schools in Bloomington, Indiana implemented an IPM program in 1995, it was spending about $34,000 on pest management. With the hiring of an IPM Coordinator

in 1997, and spending less than $1,000 per year on products, the school district is saving around $13,600 annually in pest management costs.[123] Conventional pesticide use has dropped by approximately 90 percent with the IPM program, and all aerosol and liquid pesticides have been discontinued.[124]

Examples of Hospital IPM Programs

The following hospital facilities have instituted IPM policies that have significantly decreased their unnecessary use of pesticides.

Veterans Hospitals

As highlighted in the 1995 Beyond Pesticides report, *A Failure to Protect*, which surveyed six veterans hospitals, the Department of Veterans Affairs (VA) has an IPM policy that says that due to "the rising public concern over the accumulation of pesticides in the environment and resulting adverse effects on some wildlife populations and hazards to human health, the concept of IPM has become the economically-efficient, environmentally preferable approach to pest control."[125] The VA policy describes specific IPM tasks in detail including inspections, environmental sanitation, no chemical control methods where appropriate alternatives exist, identification of sensitive areas and the selection, and use of the least hazardous pesticide when needed. VA requires a pest management plan for each facility. Its policy discourages the periodic application of pesticides as a preventive measure, promoting instead the use of non-chemical methods to prevent and manage pests. The "control of pests through alternative methods (environmental sanitation, trapping, exclusion, etc.) is the first choice, and only after these methods have failed should the least toxic pesticide be employed and only to the extent necessary for effective control."[126]

"Everybody's knee-jerk reaction is to haul out some pesticide and just kill the critters," says Wayne Warren, director of environmental program services for the Veterans Health Administration. "That's not always the best thing to do." Warren suggests that more hospitals should be using vacuum cleaners as part of their pest management program as they pose no health hazard to the operator, are effective in removing pests, and can be used anywhere in the facility.[127]

Oregon Health and Science University

The Oregon Health and Science University (OHSU) includes four schools, two hospitals, dozens of primary care and specialty clinics, research institutes and centers, and community service programs. The Facilities Management and Construction office of the Grounds Department has nine staff to maintain their 120-acre campus in Portland, which includes the state run hospital.[128] The OHSU outdoor IPM policy states that its intent "is to provide an acceptable level of pest control while insuring minimal human exposure to hazardous materials, minimizing the health risks, inflicting minimal environmental hazard upon the environment, providing for effective monitoring through inspections and record keeping, and evaluating the effect of the IPM program." The policy establishes the Grounds Coordinator as being responsible for the implementation of the campus-wide IPM program. The policy states, "Once the threshold has been surpassed, treatment and control options will be determined. The least toxic alternative that will obtain the necessary control of the pest will be used." The policy contains a prioritized four-option system for making pest management decisions. The fourth, or last, option to be considered is chemical controls, which should be "the least toxic to the environment, as well as the least toxic to the applicator and the campus patients, visitors, and staff." Even the listing of this last option is prioritized – spot treatment is to be used before "a comprehensive treatment, the use of which would likely be unusual."

OHSU's policy also has a notification component that states, "The use of any control option that may have an impact on persons or departments in the immediate area should be accompanied by proper notification of the action to be taken. This notification will include Facilities Management and Construction Public Safety Dispatch, so building air intakes can be secured and alerting anyone with open windows of the immediate treatment area." The policy recommends that applications be scheduled at times of least effect on the public. If pedestrians or vehicles will be present during the application, barriers and traffic flaggers are used to divert them from the application area. Other provisions in the OHSU policy include pesticide safety training for all applicators and the requirement to keep detailed records of pests, interventions, and pesticide use. The IPM program is evaluated annually. Although in-house staff currently implement the facility's IPM policy, there is a provision in the policy requiring outside contractors to follow the policy as well.

San Francisco General Hospital

In October 1996, San Francisco passed a groundbreaking policy to reduce the use of pesticides on city property by city departments, agencies, and contractors, including San Francisco General Hospital (SFGH). The landmark ordinance bans pesticides suspected of causing cancer and reproductive harm and those that are most acutely toxic. It also requires an IPM approach to pest management, posting notices of most pesticide applications 72 hours before and after an application, and the exclusive use of approved pesticides. The resulting pest management program emphasizes education and developing less-harmful alternatives to toxic chemicals, such as mulching, hand weeding, using flamers and natural predators. The program also recommends planting foliage that is suitable to San Francisco's climate and, therefore, more naturally resistant to pests. *(For more information, see Figure 30 on page 34.)*

Massachusetts General Hospital

The hospital's pest management program is based on IPM principles that emphasize prevention through physical exclusion and attention to sanitation. MGH "strongly oppose[s] the use of pesticides in the workplace." Baits and traps are more likely to be employed than pesticide sprays. Yet, if pesticide sprays are used, they are not to be applied in an occupied room. The hospital uses triangular wall sconces that emit a blue light to attract flying insects, which then stick to an adhesive board on the bottom of the trap. These traps are effective in keeping flying insects from entering the facility and moving into sensitive areas.[129]

Brigham and Women's Hospital

Brigham and Women's Hospital is a 700-bed tertiary care hospital in an urban setting that anchors the Longwood Medical Area of Boston. Combined inpatient and outpatient volume correlates to a facility of nearly 3.5 million square feet. The Environmental Services Department of Brigham and Women's Hospital is responsible for the facility's pest management program. Their IPM policy was adopted in January 1989 and has been regularly updated since then. As written in the policy, the purpose is, "To ensure a healthy, sanitary, and attractive environment for patients, staff, and visitors through the application of integrated pest management principles." Pest management services are required to be provided by an outside contractor, but the contactor must meet the policy's vendor qualifications. The policy states, "The use of chemical pesticides is strongly discouraged and only authorized by the Director on a case-by-case basis. Upon exhaustion of alternative, non-pesticide treatments the vendor may recommend limited use of the least hazardous effective chemical pesticide. The Director will review such recommendation and, if in concurrence, will submit the relevant Material Safety Data Sheets to the Environmental Health and Safety Department for review and recommendations prior to the authorization of limited pesticide use. A record of the chemical application … will be entered… for future reference. Wherever possible, application of chemical pesticides will be limited to wall voids, mechanical spaces, etc. to minimize the potential for human exposure. Aerosolized pesticides will not be used in areas where human exposure potential exists. Any limited use of pesticides will be implemented only with the awareness and approval of the manager of the area being serviced." Other provisions in the policy include the requirement for weekly communication between the pest control service contractor and the Director; posting of notification signs for lawn pesticide applications; and prohibition of storing or mixing pesticides within the hospital facility. Baits and hospital disinfectants are excluded from the policy. *(For more information, see Figure 31 on page 36.)*

Hackensack University Medical Center

Hackensack University Medical Center (HUMC) is a 683-bed tertiary care teaching and research hospital in New Jersey covering 2.2 million square feet. The buildings range in age from 3 years to 106 years old. The hospital initiated its IPM program in the late 1990's using a local pest control contractor. Staff was re-trained and educated in new policies and practices. Buildings were examined and repair problems were addressed. According to those that oversee the program, the use of pesticides is strongly discouraged. Preventive measures are always the first step, such as weekly monitoring of specific areas (food, medical waste and solid waste areas) and the use of mechanical traps. Sightings are immediately reported to environmental services and are dealt with in the most humane and least hazardous way. This includes evaluating the type of infestation, the efficacy and toxicity of the available alternatives, and the manner in which products are applied. HUMC reports that it has not observed any infestations since its conversion to IPM.[130]

FIGURE 30. A CLOSER LOOK AT SAN FRANCISCO GENERAL HOSPITAL'S IPM PROGRAM

Interview with Deanna Simon, Toxics Reduction Specialist, San Francisco Department of the Environment (Part 1 of 2)

What are the main pest problems you needed to solve?
The main problems at San Francisco General Hospital (SFGH) are ants, rodents, and pigeons whose windowsill defecation creates objectionable smells and health hazards.

What have you done in landscape/building design to prevent pest problems?
Because the buildings are very old and were built before "designing for pest control" was a paradigm, we continually try to modify the existing structure. This includes installing window screens, caulking to exclude ants, and installing wires and spikes to prevent birds from landing on windowsills and ledges. We have also centralized our garbage to minimize pest aggregation areas and facilitate monitoring and control. To keep outdoor pests such as rodents from entering, our landscaping design requires a 12" to 18" vegetation-free zone next to all building structures, especially where ivy grows. We also choose landscape plant varieties with few known pest problems, less allergenic and pollen-producing plants, and species producing reduced amounts of fruit. Several areas have weed fabric and mulch to reduce or eliminate weed growth. We have also installed door sweeps to prevent rodents from entering the building especially in loading dock and trash collection areas.

What are some of the techniques you use to prevent and manage weeds?
We avoid spraying pesticides or herbicides more than 99% of the time. This is out of concern for our immune-compromised patients and because of the unknown combined effects of pharmaceuticals and pesticides on patients' health. In the past we have used propane flamers to control weeds in hardscaped areas, and we receive annual training in the use of this technology. Other landscaped areas are hand-weeded, weed-whacked, or have weed fabric and mulch as a long-term weed control strategy. We have invested considerable energy into changing our paradigm of what a tolerable plant is, and we now have a greater diversity of vegetation in our lawns. We also fertilize the lawns regularly promoting vigorous grass growth which crowds out broadleaf weeds, and top dress areas where weeds are hand-pulled. Aeration and leaving grass clippings in place further enriches the soil and promotes a healthy, vigorous lawn.

What are some of the techniques you use to prevent and manage pests?
Sanitation – hospital staff have been trained to wash out trash containers, rinse drink cans to prevent fruit flies, and not keep food in their lockers or desks. Regularly cleaning floor and sink drains and removing accumulated food particles under kitchen equipment are also very important in our plan. Exclusion includes installing pigeon wires, bird spikes and screening, door sweeps, and an air blower in the kitchen; and caulking areas where ants enter buildings. All ivy is cut back from buildings at least 12 inches to remove easy building access for rodents. Vacuums are used to remove pests, especially flying insects such as bees and wasps inside buildings. Aphids are removed from landscape plants by spraying them off with water; insecticidal soaps are used rarely and only for extreme problems.

Monitoring and trapping helps with early detection of pest problems and also helps track the size of a population in order to evaluate whether our methods are working. We have trained nursing and custodial staff to look for and report the first signs of pest problems to our Pest Control Contractor (PCC). To accomplish this we use lots of sticky traps, and have centralized all the pest information from the entire facility into one office where a pest-sighting logbook is continually updated for quick reference by our PCC.

How do you manage stinging insects?
We do not have frequent stinging insect problems. For the renegade indoor bee or wasp, we vacuum it up. On the rare occasion we find a nest, we physically remove and destroy it, then seal and caulk the area to prevent future infestations. We use a vacuum or steam to destroy ground nests.

How do you decide when and if to use pesticides?
Pesticides are reserved for last resort or emergency use only. Although certain, reduced risk, pesticides are "allowed" for use under the Citywide IPM program, other methods are tried first, and they almost always succeed. Our staff has received extensive training to ensure that everyone is on board with prevention measures and alternative controls.

What is the key to your success?
There are three factors that stand out as critical to our success. The first is to have a PCC who is committed to finding and using least toxic control measures. However, he could not do his job without the cooperation of our hospital staff. A top-down commitment to toxics reduction and continual trainings have generated buy-in and cooperation from our staff, who play a key role by helping with sanitation, prevention, monitoring, and communicating pest problems as they develop to our PCC. Also, our staff have access to a network of advisors for support and advice, including the Department of the Environment, members of the Citywide IPM Technical Advisory Committee, and a team of professional pest management consultants.

What have been your biggest challenges?
Our aging buildings with few screens and ample gaps for pest entrance, combined with a limited budget for non-emergency pest control, often make it difficult to be proactive. Also, it is difficult to enlist the participation of our entire custodial staff to check traps and clean for pest prevention. Hospital custodians are often stretched thin and we can run into resistance when we appear to be adding extra work to already busy schedules.

How do you notify the public?
The City of San Francisco IPM Ordinance requires posting notices of all pesticide applications. Because we do not spray, our only pesticide use is in baits used for rodents,

FIGURE 30. A CLOSER LOOK AT SAN FRANCISCO GENERAL HOSPITAL'S IPM PROGRAM

Interview with Deanna Simon, Toxics Reduction Specialist, San Francisco Department of the Environment (Part 2 of 2)

ants, and cockroaches. Notification of the ongoing use of these baits is posted near the building entrance and on bulletin boards or walls near other notices.

Is there a process for responding to pest control questions and complaints?
Because of our diligent monitoring and prevention, we have had few pest complaints in our facilities. Questions and concerns are directed to the hospital's IPM coordinator. She can answer most questions and acts as the interface between hospital visitors, staff and the PCC. In addition the hospital IPM Coordinator maintains a list of contacts for reference. We also have staff at the City's Department of the Environment who oversees the Citywide IPM program, and they are always available to answers questions.

What have you done to train staff? What training materials or organizations have you found most useful?
We have periodic trainings coordinated with the help of the City's Department of the Environment (DOE) that cover topics such as hospital-specific IPM for our nursing staff, use of weed flamers for our gardeners, and custodial roles in IPM. The DOE also presents a wide range of pest control issues to our staff through workshops, annual Pesticide Handler Trainings, and an annual IPM conference. Continuing education credits are granted whenever possible. We also conduct specialty topic trainings covering such issues as West Nile virus, Hanta virus, and the health hazards of pigeon droppings.

The Department of the Environment, through monthly meetings and general distribution, makes available information such as updated lists of City-approved reduced risk pesticides, the SF IPM training manual, fact sheets on various pests, guest speaker materials from monthly meetings, and the recently created IPM newsletter. San Francisco General Hospital (SFGH) has also developed our own structural pest control training manual for use by our staff and PCC.

In the calendar years 2001 and 2002, what were your expenses for pesticides and pesticide application?
SFGH pays $1,700 per year for contracted structural pest control services. This includes all site visits and materials used (almost exclusively traps and baits). Each month every building is fully inspected, with some areas (i.e. the cafeteria) receiving more frequent attention. This does not include labor or materials for large-scale pest exclusion jobs. In addition, the Department of Public Health (of which San Francisco General Hospital is one facility) contributes $17,000 annually to the Citywide IPM program to help fund staffing, training, and pest management consultant services.

What were your expenses for other pest control measures (i.e. labor, equipment)?
Our 2001 and 2002 pest control expenses were a total $125,000 and $80,000, respectively. This included costs for facilities, personnel, labor, and contractual work above and beyond our regular structural pest control service mentioned above. This amount covered landscape pest control, pigeon control (netting, spiking, and lots of cleaning to discourage roosting), window repair, installation of door sweeps to exclude rodents, installation of a blower in the kitchen to exclude flies, and other structural and landscape pest exclusion work.

Did you obtain start-up or other funds to implement the program?
Our start-up funds were minimal, largely because the program and trainings were coordinated and funded by the Department of the Environment, which administers the Citywide IPM umbrella program. Our IPM coordinator is also our Health and Safety Officer, and her IPM responsibilities take up about 10% of her time.

What would have made your transition easier? What types of assistance would be useful to you now in implementing IPM?
Persistent leadership and thorough staff trainings facilitated our transition. At this point two things would make IPM easier to implement: extensive building renovations, and replacement of temporary labor with permanent labor. Continually training new temporary workers is inefficient and prevents us from planning ahead.

What external resources have you used?
We use information and training from technical consultants, local experts, Cooperative Extension, University researchers and our pest control contractor, who have all helped us troubleshoot and find innovative solutions.

What suggestions do you have for a health care facility that is just starting to make the transition?
The first and most important step is to designate a committed person who can effectively communicate the importance of IPM and provide leadership and oversight during the transition. To ensure your pest control contractor is committed to IPM, re-write your contract and carefully evaluate each service proposal. In-house, a plan must be developed to promote a top-down philosophy and bottom-up buy-in through trainings and incentives. Understand that changing behavior can be a long and frustrating process, and don't give up.

It is also critical to provide new tools and technologies, not just take away old ones. A great way to do this is talking to and visiting other programs, and having meetings with other city departments to coordinate trials and share successes among peers. Don't try to reinvent the wheel!

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FIGURE 31. A CLOSER LOOK AT BRIGHAM AND WOMEN'S HOSPITAL'S IPM PROGRAM

Interview with Richard Bass, Director of Environmental Services, Brigham and Women's Hospital (Part 1 of 2)

Describe your general approach/philosophy for building and landscape management.
We see our mission as one that provides a healthy and attractive environment for staff as well as patients, consistent with the hospital's larger goal of serving the healthcare needs of the community with excellence and pride. As a key component of the support service team we have the opportunity to have a direct and measurable impact on the quality of life for patients, staff, and visitors alike.

What was the impetus to replace pesticides with alternatives?
As a department serving the needs of an advanced clinical and research community we heard and acted on the concerns of those staff as they related to indoor air quality. Current research suggests that prolonged exposure to pesticides may play a substantial role in the development and acuity of respiratory illnesses. In our acutely ill patient population, this might manifest itself in extended hospitalization or undesirable clinical outcomes. Our staff, by nature of their long-term prolonged exposure to the indoor environment, might experience a higher incidence of respiratory symptoms that could impede their ability to deliver high-quality care. Hospital leadership takes this responsibility seriously. Brigham & Women's Hospital incorporates indoor air quality into design and construction as we constantly morph our physical environment to better serve the needs of patients and staff.

How did you manage pests in the past?
Actually, I was fortunate to succeed a previous director (now my VP) who had already led the department away from pesticides and toward a healthier indoor environment. If I've added anything it has been the formalization of the policy to clarify decision-making and communication. Another key step was the replacement of the previous pest service provider with one who was willing to make the commitment to take an active stance in managing pests without the use of dangerous pesticides. Many pest control contractors state their commitment to the principles of IPM, but in my experience it's a rare one who will devote the time and energy to eradicating pests through trapping and mechanical restrictions. It's far easier to apply poisonous chemicals than to track the source of infestations and address them directly. It really is critical to communicate well with the contractor to resolve issues collaboratively. To be fair, it's unrealistic to expect any contractor to resolve infestations without pesticides absent a commitment from the hospital to resolve underlying issues.

What have you done outdoors to prevent pest problems?
Environmental Services also has responsibility for managing grounds. This has been a benefit as we've learned to keep bushes from abutting the structure to reduce harborage. We've also invested heavily in erecting barriers, whether bird-proofing exterior ledges or installing wire mesh along the foundation to prevent burrowing rodents. Within the structure, we take an active role in identifying potential pest access points for correction. Door sweeps can go a long way in preventing that initial pest infiltration which may take considerable resources to later eradicate. New cracks always develop which need caulking. We rely heavily on the Engineering Department to assist in the effort. Placement of boric acid powder in wall voids during construction can prevent later problems with silverfish and roaches.

What techniques do you use to prevent and manage pests inside the hospital?
Environmental Services focuses on thorough scheduled cleaning of waste containers, clean up immediately after food service functions, and advocates strongly for appropriate food storage. We make extensive use of glue monitors to identify specific pests. Our vendor has access to an entomologist to ensure that our response is customized to the particular problem. For instance, common German cockroaches behave quite differently from their American counterparts. Understanding the characteristics of each allows us to address the specific problem rather than utilizing a hit-or-miss approach. Baited traps are used extensively for rodents in conjunction with elimination of potential food sources and harborages.

How do you manage stinging insects?
As a facility with few open windows we are fortunate to avoid significant bees, wasps, and the like. For those that do infiltrate, our first response is with a tank vacuum cleaner. Once the immediate pest is removed, we work to identify the access point and caulk or otherwise eliminate the access.

How do you decide when and if to use pesticides?
Our policy clearly outlines our goal to manage pest issues without resorting to the use of pesticides wherever it is feasible to do so. Exceptions are rare, and implemented only with the approval and support of our Environmental Health & Safety (EH&S) staff and the manager of the affected area. We exhaust all other options. At that point the contractor may recommend the use of a specific product. If I concur, I forward the recommendation to EH&S along with the relevant MSDS (quick tip: most pesticide MSDSs are available on the Web). EH&S

FIGURE 31. A CLOSER LOOK AT BRIGHAM AND WOMEN'S HOSPITAL'S IPM PROGRAM

Interview with Richard Bass, Director of Environmental Services, Brigham and Women's Hospital (Part 2 of 2)

reviews the potential hazard of the recommended product to ensure that it minimizes potential risk while being effective, and ensures that appropriate measures are employed (treating off-shift when area is vacant, post application ventilation, etc.) to minimize risk of exposure. In my 2-year tenure we just made our second exception to the no pesticide policy in order to address a stubborn bird mite infestation in an older building.

How do you involve the public? Is there a process for responding to pest control questions and complaints?
Our procedure for handling complaints is defined in our pest management policy and procedures. We use a dedicated phone extension for reporting pest problems and answering questions. I have made it a personal priority to involve myself directly in managing significant pest issues and communicate directly and openly with all interested parties.

What is the key to your success?
It's really the communication. People like to be reassured that the pest issue is a priority for our department and be kept informed of what actions have been taken. By involving the hospital staff in the process the contractor can better understand that we must work together in order to be methodical and pragmatic in developing solutions. By resolving root issues we have a greater likelihood of avoiding recurrence, rather than using pesticides liberally for a short-term solution to the problem.

What have been your biggest challenges?
Rodent control. A mild winter coupled with adjacent construction really resulted in a very challenging year for pest control. Since we exert little or no influence over the weather and other people's activities, it is all the more critical that we make full use of mechanical means to block pest entry into buildings and act expeditiously in controlling a burgeoning rodent population.

What have you done to train staff?
Our staff's responsibility is to report pest problems they become aware of so that they can be logged for treatment. Our clerical staffs are trained to solicit considerable detail from reporters, information that can be critical in resolving the issue quickly. They know to 'turf' repeat issues or difficult situations to me forthwith. Pest control is a daily topic we touch base on.

In the calendar years 2000 and 2001, what were your expenses for pesticides and pesticide applications?
In 2000, we spent about $23,000 on all pest management (primarily routine service visits). In October 2001 we transitioned to a small independent contractor who had serviced our smaller facility for 10 years, saving nearly $10,000 with an improved service level. Extraordinary mechanical expenditures this year (mesh installation for rodent control) has consumed less than half of that savings.

Did you obtain start-up or other funds to implement the program?
We worked within our existing budget.

What types of assistance are useful to you in implementing IPM?
There are a number of good resources available to learn more about IPM. I make thorough use of the Web to answer specific questions or research particular pests.

What changes did you make first?
Identifying the strengths and weaknesses of the existing program, then developing a strategic plan for accomplishing the goal of managing pests proactively. Logbooks play a critical communications role when managing the pest issues of a large and complex environment. I don't believe in hiding one's problems. Surprisingly, people who might initially advocate using the strongest available pesticide to solve the immediate problem really do come to appreciate that our reluctance to take that approach is out of respect for their own health. It sometimes takes longer to solve the problem without the use of pesticides, but it's time well spent to ensure that we've resolved the core issues rather than addressing the symptoms alone.

What suggestions do you have for a health care facility that is just starting to make the transition to IPM?
Educate yourself about what Integrated Pest Management really means so that you can explain it in simple terms to others. If pest control service is outsourced, select a vendor who will support your choice and not excuse a lack of results by claiming that eliminating pesticides hampers their ability to be effective. I have a bias toward independents. They tend to take the longer view toward retaining the account rather than seeking to preserve the bottom line by choosing the most expeditious solution (usually pesticides).

Richard Bass is the Director of Environmental Services for Brigham and Women's Hospital, 75 Francis Street, Boston MA 02130, 617-732-7130, rbass@partners.org.

IV. Conclusion and Recommendations

Inadequacies in federal laws have resulted in the availability of pesticide products with known adverse human health and environmental effects. With approximately 320 active ingredients in 1,600 pesticide products registered for hospital use by EPA,[131] this is especially of concern. Hospitals are meant to be places of health and healing. Their strategies for controlling pest populations must protect hospital occupants from the hazards of pesticides as well as pests.

From the hospital survey results reported, it is apparent that many hospitals control their pest problems with hazardous pesticides; often do not notify their staff, patients or the public about pesticide applications; and, do not educate their staff or others on the negative health consequences associated with many pesticides. These practices put staff, patients, and other hospital occupants at an unacceptable risk for pesticide injury.

Fortunately, an IPM program can safeguard the hospital community against harm from pests while simultaneously protecting it from the hazards of pesticides. The survey findings show that some hospitals have already implemented IPM programs. Yet, the results also suggest that the majority of U.S. hospitals have an urgent need to adopt safer pest management practices.

Beyond Pesticides and Health Care Without Harm acknowledge health institutions' paramount concern for the health of their staff, patients, and the public. With good information and proper tools, health institutions can adopt safer pest management practices in order to reduce their patients and staff's exposure to hazardous chemicals. Hospitals have a special obligation to protect their patients and to lead the way in modeling safe and effective pest management. Adopting an integrated pest management program helps health care providers to live up to their code to "First, do no harm."

Recommendations

Hospitals, government entities, the public, and the pest management industry can all take action to increase the number of hospitals adopting least hazardous IPM programs and providing pesticide use notification.

Health care facilities should:

- Develop an IPM policy and guidance materials that contain a strong and clear definition of IPM that includes the key elements outlined in this report.
- Implement an IPM program that selects the least hazardous pesticides only after non-toxic methods of pest control have been tried and found ineffective. If hospital staff implements pest management, provide staff with IPM education and technical training. If pest management is implemented by a commercial applicator, have a clear written contract that includes the IPM policy.
- Provide notification to the staff, patients, and other hospital occupants when pesticides are used in the hospital building or on the hospital's grounds.
- Provide prior notification of pesticides used on hospital grounds to neighboring property owners or residents.
- Publicize the phone number and email address for a contact person, ideally the IPM coordinator, who is able to answer questions or provide additional information about the hospital's pest management program and its pesticide use.
- Educate all hospital staff about the hazards of pesticides and the advantages and principles of IPM.
- Maintain pest management records for at least seven years.
- Stay up-to-date on the registration status of pesticides used at the hospital and on new alternative pest management products and methods.
- Establish additional guidelines to address the needs of patients and staff that are more sensitive to pesticides, such as children, the elderly, those with compromised immune or nervous systems, people with asthma, allergies, and chemical sensitivities or those undergoing chemotherapy.
- Report any incidents where a patient, visitor or hospital staff member is made sick by a pesticide used at the hospital to EPA and state health agencies.
- Provide pesticide-free areas for patients who have a medical condition and/or disability that makes them more susceptible to becoming ill from pesticides.
- Work with the Joint Commission on Accreditation for Healthcare Organizations (JCAHO) to develop, monitor, and support an Environment of

Care Standard that requires hospitals to have a written IPM Plan that includes the key elements outlined in this report.

Federal, state, and local government entities should:

- Develop hospital IPM policy and guidance materials that contain a strong and clear definition of IPM that includes the key elements outlined in this report.
- Pass legislation to require hospitals to adopt IPM policies and disclose pesticide use to workers and the public through posting, individual notification, and upon request.
- Develop an IPM training and certification process for commercial pest control operators and hospital employees. Commercial operators without certification should not be eligible for hospital contracts.
- Prohibit the use of hazardous pesticides at hospitals when less hazardous alternative practices exist.

The public should:

- Advocate for the adoption of strong IPM programs at hospitals.
- Inquire about the pest management of hospital buildings and grounds in their communities.
- Advocate for public policies that promote safer pest management practices and strengthen restrictions on hazardous pesticides.

The pest management industry should:

- Become informed and acquire expertise in true least hazardous IPM.
- Expand the number of businesses that provide these IPM services.
- Disclose pest management practices and pesticide use to the public.
- Work for the adoption of industry-wide IPM standards for training and certification.

For more information, contact Beyond Pesticides or Health Care Without Harm or see the Resource List in the Appendix for a list of organizations, IPM companies, and government contacts.

V. Appendix

Resource List

For more information on pesticides and implementing a hospital IPM program, contact the following organizations, consultants, government entities, and/or consult Beyond Pesticides' Safety Source for Pest Management to find pest management companies that practice IPM.

Beyond Pesticides
701 E Street, SE, Suite 200
Washington DC 20003
202-543-5450
info@beyondpesticides.org
www.beyondpesticides.org

Bio-Integral Resource Center
PO Box 7414
Berkeley CA 94707
510-524-2567
birc@igc.org
www.birc.org

Californians for Pesticide Reform
49 Powell Street, #530
San Francisco CA 94102
415-981-3939
pests@igc.org
www.pesticidereform.org

Health Care Without Harm
1755 S Street, NW, Suite 6B
Washington DC 20009
202-234-0091
info@hcwh.org
www.noharm.org

International Pest Management Institute
275 South 3rd Street, #312
Burbank CA 91502
818-843-8304
bugebill@earthlink.net

IPM Institute of North America
1914 Rowley Avenue
Madison WI 53705
608-232-1528
ipmworks@ipminstitute.org
www.ipminstitute.org

National Center for Environmental Health Strategies
1100 Rural Avenue
Voorhees NJ 08043
856-429-5358
info@ncehs.org
www.ncehs.org

National Pesticide Information Center
Oregon State University
333 Weniger
Corvallis OR 97331
800-858-7378
npic@ace.orst.edu
http://npic.orst.edu

Northwest Coalition for Alternatives to Pesticides
PO Box 1393
Eugene OR 97440-1393
541-344-5044
info@pesticide.org
www.pesticide.org

Pesticide Action Network North America
49 Powell Street, Suite 500
San Francisco CA 94102
415-981-1771
panna@pann.org
www.panna.org • www.pesticideinfo.org

U.S. Environmental Protection Agency
Office of Pesticide Programs
Ariel Rios Building
1200 Pennsylvania Ave., NW
Mail Code 3213A
Washington, DC 20460
202-260-2090
www.epa.gov/pesticides

Hospital IPM Companies
The Safety Source for Pest Management: A National Directory of Least-toxic Service Providers at www.beyondpesticides.org/safetysource provides a list of pest management companies that practice IPM. Companies are listed in the directory because they have completed the Beyond Pesticides questionnaire and indicate that they use one or more practices and/or materials that Beyond Pesticides categorizes as "non-toxic" or "least-toxic." Included in the directory are the companies' survey responses in their own words. Many of the companies in the directory operate businesses that Beyond Pesticides considers "mixed operations" because they may also use products that are classified as "toxic." As a customer, it is important to talk with the service provider about the products that they use, learn about their potential to cause adverse effects, and decide what action is most appropriate for the pest problem needing to be addressed.

Model Hospital Integrated Pest Management (IPM) Policy*

Section 1. Policy Goals.

(a) To manage pests in a manner that will not harm humans or the environment.

(b) To reduce or eliminate the use of toxic pesticides.

(c) To provide ample notification to the hospital community in the event that a hazardous pesticide product is applied.

Section 2. General.

The requirements of this policy apply to hospital buildings and grounds. This policy shall apply to any person that applies a pesticide or engages in other pest control activities in a building or on the grounds, including a custodian, staff member, or commercial applicator. All individuals that apply a pesticide must be licensed by the state.

Section 3. Director of Environmental Services.

The Director of Environmental Services, or other appropriate staff person, is responsible for developing and overseeing the implementation of the integrated pest management (IPM) program. The Director shall designate a contact person for inquiries about the IPM program; maintain Material Safety Data Sheets (MSDSs) and labels for all pesticides which may be used inside or outside the facilities; maintain scheduling of all pest monitoring and pesticide usage; stay up-to-date on new IPM materials and methods; obtain periodic updates and training from IPM experts; on request make the hospital's pest management and pesticide use data available to the public for review; and, present an annual report to the Board, CEO, or other appropriate administrator evaluating the progress of the integrated pest management program. The Director is also responsible for coordinating the training of individuals that implement the IPM program.

Section 4. Integrated Pest Management.

Integrated pest management is an approach to pest control that eliminates or mitigates economic and health damage caused by pests, while minimizing or eliminating the use of pesticides and their risk to human health and the environment. IPM involves site or pest inspections; pest population monitoring; and the evaluation of the need for action. The primary control methods focus on pest prevention and include improving sanitation, making structural repairs, and using mechanical, physical, cultural, and biological controls. A least hazardous pesticide is only applied if non-toxic methods have been ineffective or are not appropriate.

Each pest control technician, whether a hospital employee or outside contractor, is responsible for documenting a pest problem, actions taken to correct the problem and their outcomes, and findings relevant to the source of the infestation. The pest control technician shall fill out a Service Report Form, which shall be kept in a logbook at the hospital's Environmental Services Department. A logbook shall be kept in a central location and shall be used to document the pest control program. The hospital staff and/or pest control technician shall report the presence of pests in a timely manner.

Section 5. Pesticide Notification.

Not less than 72 hours before a pesticide is applied in a hospital building or on hospital grounds, the Director shall provide to each staff member and patient that is expected to be residing in the area to be treated, written notice of the proposed pesticide application. The Director shall pre-notify abutting property owners, if a pesticide application will be made on the hospital's lawn or landscape. Notice shall include the brand name, active ingredient, and U.S. Environmental Protection Agency registration number of the pesticide to be used; a description of the location where the pesticide will be applied; a description of the date and time of application, except that, in the case of outdoor pesticide applications, each notice shall include three dates, in chronological order, that the outdoor pesticide applications may take place if the preceding date is canceled due to weather; the target pest and description of potential adverse effects of the pesticide based on the label or MSDS for the pesticide; a description of the reasons for the application of the pesticide; the application method; the applicator's name and company; the name and telephone number of whom to contact for more information; and any additional warning information related to the pesticide.

At least 72 hours before a pesticide is used at a hospital facility, the pest control applicator shall post a sign that provides notice of the application of the pesticide in a prominent place that is in or adjacent to the location to be treated and at each entrance to the building or grounds to be treated. Signs shall contain the same information as written notices and remain in place during the pesticide application and for at least 72 hours afterwards.

Section 6. Emergency Pesticide Use.

If a hospital applies a pesticide due to an emergency, care shall be taken to make sure the area is unoccupied prior to the pesticide application and notification shall be provided to all staff and patients expected to be residing near the treated area within 72 hours after an application takes place. A sign that meets the requirements under Section 5 shall be posted warning of the pesticide application no later than the time the application commences.

Section 7. Hospital Pesticide Use.

The following are prohibited (except when a pest problem causes an urgent threat to health):

(a) The use of the most dangerous pesticides:

(1) Pesticides in U.S. EPA Categories I and II (i.e., those with highest acute toxicity);

(2) Pesticides linked to cancer — U.S. EPA Class A, B, C carcinogens <www.epa.gov/pesticides/carlist/index.html> and chemicals known to the state of California to cause cancer under Proposition 65 <www.oehha.org/prop65/prop65_list/Newlist.html>;

(3) Pesticides that interfere with human hormones and/or cause birth defects or reproductive or developmental harm, e.g., those identified as reproductive or developmental toxins or suspected endocrine disruptors <www.pesticideinfo.org> or chemicals known to California to be reproductive toxins under Proposition 65 <www.oehha.org/prop65/prop65_list/Newlist.html>;

(4) Pesticides in the carbamate (carbaryl, bendiocarb, etc.), organophosphate (diazinon, acephate, etc.) or pyrethroid (cyfluthrin, permethrin, etc.) chemical family and phenoxy herbicides (2,4-D, mecoprop, etc.); and,

(5) Pesticide products that contain inert ingredients categorized by the U.S. EPA as "List 1: Inerts of Toxicological Concern" (dioctyl phthalate, formaldehyde, hydroquinone, isophorone, nonylphenol, phenol, and rhodamine B)

(b) Pest management decisions based on aesthetics alone.

(c) The application of pesticides on a routine basis, whether pests are present or not.

(d) The application of pesticides while the area is occupied or may become occupied during the 24 hours following the application.

(e) The application of pesticides by fogging, bombs, or tenting or by space, broadcast, or baseboard spraying.

Section 8. Record Keeping.

(a) Written or electronic records shall be kept of all pest monitoring data, including the presence or absence of pests, factors contributing to pest infestations, interventions, and their outcomes.

(b) Written or electronic records of all pesticide applications made at the hospital facility shall be maintained on site for a period of not less than seven years, and shall be made available to the public upon request. The record shall be completed on the day of the pesticide application, and shall include, but is not limited to the:

(1) target pest and reason for the application(s);

(2) date and time of the application;

(3) application area;

(4) brand name and active ingredients of the pesticide product;

(5) name of the pesticide manufacturer;

(6) U.S EPA registration number;

(7) method of application and quantity of pesticide used;

(8) least hazardous and non-chemical alternative methods or treatments that were tried and/or unavailable to accomplish the desired objectives and the reasons why the application of the proposed pesticide was chosen;

(9) possible adverse health effects to humans as stated on the label or MSDS; and,

(10) name, address, and phone number of the individual who applied the pesticide.

Section 9. Reporting.

The Director shall annually review its IPM program to evaluate its effectiveness and to identify areas where improvement is needed. The report shall be submitted to the hospital's Board, CEO, or other appropriate administrator and made available to the staff and public upon request.

**This document is for educational purposes only and does not constitute legal or health advice. Health care providers and institutions should seek legal and medical advice to ensure that pest management programs meet legal and patient care responsibilities, including compliance with applicable pesticide notification laws and regulations.*

Cover Letter and Survey

Health Care Without Harm

Dear Facilities Manager:

As you may be aware, Health Care Without Harm: The Campaign for Environmentally Responsible Health Care (HCWH) is an international coalition composed of over 340 member-organizations in 36 countries. These members include health care systems, organizations of health professionals, labor, environmental groups, religious organizations and health-advocacy groups. The mission of HCWH is to transform the health care industry so that it is no longer a source of environmental harm, without compromising safety or care.

HCWH has assisted numerous medical facilities in reducing their dioxin and mercury emissions. Now we are expanding our focus to help hospitals reduce their pesticide use and find less-toxic ways to manage pests within and outside their buildings. This is desirable because exposures to many commonly used pesticides can cause wheezing, vomiting, diarrhea, headache, seizures and other serious health problems. Pesticides are also increasingly being linked with a myriad of chronic illnesses including cancer, asthma, birth defects, hormone disruption, learning disabilities, Parkinson's disease and multiple chemical sensitivities.

Before HCWH can work with hospitals on their pest management, we must first gain a better understanding of what pesticide products are currently being used. Enclosed you will find a survey of pest control practices and pesticides use that HCWH is distributing to the top 171 hospitals in the United States (as determined by U.S. NEWS & WORLD REPORT, 2001). The purpose of this survey is to determine which pesticides are being used in the nation's hospitals. **A member of HCWH will be contacting you to see if you need help with the survey.** We will then work with interested hospitals to develop or improve safer integrated pest management (IPM) programs for their facilities.

Aggregate data from the survey will also be used to write a report on the current state of pesticide use in U.S. hospitals. Other than an appendix listing the 171 facilities on the U.S. News list, no hospital names will be mentioned in the report except those hospitals demonstrating best-practices pest management techniques and/or model IPM programs. All hospitals that complete a survey will automatically receive a copy of the report. Other hospitals can obtain a copy by visiting our website, www.noharm.org.

Thank you for taking the time to complete this survey. We look forward to continuing our work with hospitals to make them as environmentally safe as possible.

Sincerely,
Catherine Porter, Co-Chair, Health-Affected Work Group, Health Care Without Harm

Pesticide Use Survey

Please complete and return to HCWH by January 15, 2002

Date survey was completed: _____

Name of hospital: _____

Address: _____

Main information phone number: _____

Name of person completing survey: _____

Job title: _____

Direct phone: _____

Hospital type: ❑ Non-profit ❑ Urban ❑ For-profit ❑ Suburban ❑ Rural

Number of beds: _____ Affiliated with a university? Y N

Specialty: ❑ General ❑ Children's ❑ Women's ❑ Cancer ❑ Eye ❑ Rehabilitation/Orthopedic ❑ Other

Part I

For each question below, circle the response that best fits the situation at your facility.

1.	Does your facility use chemical pesticide products inside the hospital?	Y	N	
2.	Does your facility use chemical pesticide products on hospital grounds?	Y	N	
3.	Are Material Safety Data Sheets (MSDS) on file and available to hospital staff for all pesticides used in your hospital or on hospital grounds?	Y	N	
4.	Are hospital staff members given training on the health effects of pesticides?	Y	N	
5.	Do you post warning signs when pesticides are used in the hospital?	Y	N	No pesticides used
6.	Do you post warning signs when pesticides are used on hospital grounds?	Y	N	No pesticides used

7. Do you provide other forms of notification to staff, patients, or others when pesticides are used in the hospital? Y N No pesticides used

If "yes" to #7, please describe the forms of notification and to whom they are directed (e.g., table tents in hospital cafeteria to inform hospital staff about monthly roach spraying):

_____

_____

8. Do you provide other forms of notification to staff, patients, or others when pesticides are used on hospital grounds? Y N No pesticides used

If "yes" to #8, please describe the forms of notification and to whom they are directed

_____

_____

9. Does anyone keep records of pesticides used in the hospital? Y N No pesticides used

10. If yes, who keeps the records? (Title/position of record keeper)

_____

11. If records are kept by a contractor, are copies also kept at the hospital? Y N

12. Does anyone keep records of pesticides used on hospital grounds? Y N No pesticides used

13. If yes, who keeps the records? (Title/position of record keeper)

_____

14. If records are kept by a contractor, are copies also kept at the hospital? Y N

15. What percentage of your pest management is handled by outside contractors? _____ % indoors _____% outdoors

16. What percentage of your pest management is handled by staff/employees? _____ % indoors _____% outdoors

17. Does your hospital have a written pest management plan? Y N Don't know

18. Does your hospital use an integrated pest management (IPM) approach to pest management? Y N Don't know

19. What is the approximate cost per year for your hospital's pest management? $_____

Part II

Please use the following chart to list all chemical pesticide products (excluding disinfectants) used in your hospital or on its grounds in the past year. "Pesticides" refer to products used to kill or repel pests (e.g., insects, rodents, birds, weeds). Please attach additional sheets if necessary.

Brand name & EPA registration #[1]	Active ingredient(s)[2]	Areas treated[3]	Method of application[4]	Frequency of application & whether applied regularly or as-needed[5]
Example: Tempo 20 WP EPA #3125-380	Cyfluthrin	Cafeteria Loading dock Building perimeter	Spray Spray Spray	Monthly (regular) Every 3 mos. (as needed) Monthly (regular)

1 Please list each pesticide product applied in your hospital or on its grounds in the last year.
2 Active ingredients can be found on the product labels.
3 Identify the indoor and outdoor area(s) where this pesticide was applied (e.g., cafeteria, patient room(s), building perimeter, lawn, shrubs).
4 Identify the method of pesticide application (e.g., spray, granules, fog, bait).
5 Identify the frequency of application to each area (e.g., weekly, monthly, twice a year) and whether the applications were made on a regular calendar basis or only as needed based upon pest populations.

Part III

In the space below (or as an attachment), please add any comments or information that you would like to share about how your hospital manages pests.

Thank you for your cooperation in completing this survey. Please return the completed form to Health Care Without Harm, 1755 "S" St NW, Suite 6B, Washington, DC 20009 or fax to 202-234-9121 by January 15, 2002.

Hospital Pesticide Use Survey Results

Hospitals returned survey:
22 hospitals representing 12 states & District of Columbia:

- CA: 4
- IL: 3
- MA: 2
- AZ: 2
- CO: 2
- TX: 2
- DC: 2
- OH, OR, FL, NH, PA: 1 each

Pest Management Contact in Hospitals:

- Environmental Services (manager or director): 12
- Safety Manager: 2
- Hired Pest Management Contractor: 2
- Grounds Department (Coordinator): 1
- Industrial Hygienist: 1
- Guest Services (manager): 1
- Consulting Entomologist: 1
- Housekeeping Services: 1
- Department Trainer: 1

Type of Hospital:

- Non-profit: 17
- For-profit: 2
- Did Not Answer: 3

- Urban: 10
- Suburban: 0
- Rural: 1
- Urban, Suburban, and Rural: 1
- Did Not Answer: 10

Number of Beds:

- Total: 10,015
- Range: 93 - 998
- Other (outpatient facility): 1

Affiliated with a University:

- Yes: 16
- No: 3
- Did Not Answer: 3

Specialty: (some hospitals chose more than one)

- General: 13
- Children's: 7
- Women's: 5
- Cancer: 6
- Eye: 3
- Rehabilitation/Orthopedic: 6
- Other: teaching (1); trauma (2); research (3); asthma/lung (1)
- Did Not Answer: 3

1. Does your facility use chemical pesticide products inside the hospital?

- Yes: 20
- No: 1
- Did Not Answer: 1

2. Does your facility use chemical pesticide products on hospital grounds?

- Yes: 17
- No: 5

3. Are Material Safety Data Sheets on file and available to hospital staff for all pesticides used in your hospital or on hospital grounds?

- Yes: 20
- No: 1
- Did Not Answer: 1

4. Are hospital staff members given training on the health effects of pesticides?

- Yes: 6
- No: 10
- Did Not Answer: 6

5. Do you post warning signs when pesticides are used in the hospital?

- Yes: 6
- No: 12
- No Pesticides Used: 1
- Did Not Answer: 3

6. Do you post warning signs when pesticides are used on hospital grounds?

- Yes: 8
- No: 10
- No Pesticides Used: 2
- Did Not Answer: 2

7. Do you provide other forms of notification to staff, patients, or others when pesticides are used in the hospital?

Yes: 8

No: 9

No Pesticides Used: 1

Did Not Answer: 4

If "yes" to #7, please describe the forms of notification and to whom they are directed.

- Inform contact person in area complaining of pests
- Verbal or documented notice of when and where pesticides will be used provided upon request
- Follow all California regulations (2)
- Communicate to staff directly
- Treatment is discussed with staff at treated area, usually one week in advance
- Inform RN supervisor of the affected area
- Send email

8. Do you provide other forms of notification to staff, patients, or others when pesticides are used on hospital grounds?

Yes: 6

No: 10

No Pesticides Used: 5

Did Not Respond: 1

If "yes" to #8, please describe the forms of notification and to whom they are directed.

- Arborists, contractors informed by department before application
- Service tickets state what used, where
- Direct communication to staff
- Nursing supervisor, infection control, maintenance and security are notified
- Verbal, written to maintenance staff

9. Does anyone keep records of pesticides used in the hospital?

Yes: 17

No: 0

No Pesticides Used: 1

Did Not Answer: 4

10. If yes, who keeps the records?

Environmental Services: 11

Housekeeping Department: 3

Supervisor of Facilities: 1

Guest Services: 1

Customer Service Department: 1

Contractor: 1

Did Not Answer: 3

Not Applicable (No Pesticides Used): 1

11. If records are kept by a contractor, are copies also kept at the hospital?

Yes: 16

No: 0

Not Applicable: 1

Did Not Answer: 5

12. Does anyone keep records of pesticides used on hospital grounds?

Yes: 14

No: 2

No Pesticides Used: 5

Did Not Answer: 1

13. If yes, who keeps the records?

Environmental Services: 6

Pest Control Company: 5

Housekeeping Department: 2

Supervisor of Facilities: 1

Grounds Supervisor: 1

Not Applicable: 5

Did Not Answer: 2

14. If records are kept by a contractor, are copies also kept at the hospital?

Yes: 13

No: 1

Not Applicable: 3

Did Not Answer: 5

15. What percentage of your pest management is handled by outside contractors?

Indoors:	100%:	14
	99%:	1
	98%:	1
	20%:	1
	0%:	0
Did Not Answer:		5
Outdoors:	100%:	8
	25%:	1
	10%:	1
	5%:	1
	0%:	4
Did Not Answer:		7

16. What percentage of your pest management is handled by staff/employees?

Indoors:	100%:	0
	80%:	1
	2%:	1
	1%:	1
	0%:	14
Did Not Answer:		5
Outdoors:	100%:	1
	95%:	1
	90%:	1
	75%:	1
	0%:	11
Did Not Answer:		7

17. Does your hospital have a written pest management plan?

Yes: 14

No: 2

Do Not Know: 2

Did Not Answer: 4

18. Does your hospital use an integrated pest management (IPM) approach to pest management?

Yes: 16

No: 2

Do Not Know: 2

Did Not Answer: 2

19. What is the approximate cost per year for your hospital's pest management?

Did Not Answer: 7

Do Not Know: 2

Total for 13: $347,149.00

Range: $4,800 (outpatient only facility) - $150,000 (898 bed facility)

$4,800: 1

$5,000: 1

$7,788: 1

$10,000: 1

$11,000: 1

$12,000: 1

$15,000: 3

$29,800: 1

$35,000: 1

$36,761: 1

$150,000: 1

Hospitals that Provided List of Pesticides Used in Facility: 17

Total Number of Pesticide Products Listed: 216

Number of Different Pesticide Products Listed: 159 pesticides products

Number of Active Ingredients: 80

Pesticide Products Listed on Returned Hospital Surveys:

Advance Carpenter Ant Bait
Advance Dual Choice
Advance Granular Ant Bait
Amdro Fire Ant Insecticide
Atrazine
Avert 310
Avert Cockroach Bait Stations Formula 1
Avert Cockroach Gel Bait Formula 2
Avert Cockroach Gel Bait Formula 3
Avert Dry Flowable
Avid 0.15 ec Miticide/Insecticide
Avitrol Whole Corn
Barricade 65 WG Herbicide
Barricade Herbicide
Basagran T/O
Baygon 2% Bait
Baygon Bait
Bayleton
Borid (Roach Kill)
Borid Barrier
Borid Turbo
BT Caterpillar Attack
Bueno
Casaron AG
CB-40 Extra
CB-80 Extra
Cleary's 3336
Confront
Conquer Residual Concentrate
Conserve
Contrac All-weather Blox
Contrac All-weather Cake
Contrac Rat & Mouse Bait
Crossbow
Cy Kick
Cynoff WSB Insecticide
Deadline 40
Demand CS Insecticide
Demon EC
Demon WP
Diathane
Diazinon Spray
Ditrac All-weather Blox
Ditrac Tracking Powder
Drax Ant Kill Gel

Drax Ant Kill PF
Drione Insecticide
Dursban Pro
Ecolab ISI 30
Ecolan 2000
ECOPCO Jet
ElioTrol
Epoleon NnZ
Esbiol fogging concentrate 2289
Ficam Dust
Ficam W
Final Blox
Flee Insecticide
FLF Atochem Knox
Fluorguard Ant Control Baits
Fly-Tek
Fore
Gentrol IGR
Gentrol IGR Concentrate
Gentrol Point Source
Gourmet Gel
Intruder HPX
Kicker EC Insecticide
Knox Out 2FM
Lesco Horticulture Oil
Malathion 50% Grade
Malathion E-5
Malathion Premium Spray
Manage
Maxforce Ant & Insect Bait
Maxforce Ant Bait
Maxforce Ant Killer
Maxforce Bait Station
Maxforce FC Ant Bait Stations
Maxforce FC Ant Station
Maxforce FC Roach Killer Bait Gel
Maxforce Gel
Maxforce Granular Insect Bait
Maxforce Granular Roach Killer
Maxforce Roach Bait
Maxforce Roach Bait Gel (reservoir)
Maxforce Roach Bait Stations
MCPP-4 Amine
Merit
Merit 75 WSP
Microcare
Mistocide-B
Monobor-Chlorate
Moss-Kil
M-Peda
Musca-cide
Niban
Niban Granular Bait
Nibor
Orthene
Outsmart
P.I.
Pathway
Pennant Liquid Herbicide
Pennant 5G
Permacide P-1
Poast
Polysul Summer & Dormant Spray Concentrate
Precor 2000
Pro-Control Dual Choice
Pro-Control Fogger
PT 1500 A Knox Out
PT 230 Tri-Die
PT 240 Permadust
PT 265A Knox Out
PT 280 Orthene
PT 3-6-10 Aerocide
PT 370 Ascent Fire Ant Stopper Bait
PT 515 Wasp Freeze
PT 565
PT 565 Plus Xlo
Purge SuperHydro-Sol
Pyrenone multi-purpose insecticide
Quintox Rat & Mouse Bait
Round-up Pro
Rout Ornamental Herbicide
Rowstar GL
Rozol Tracking Powder
Safer Insecticidal Soap
Scythe
Sevin
Siege Gel Insecticide
Snapshot 2.5TG
Sterifab
Stimukil Fly Bait
Subdue
Suspend SC
Talon G Weatherblok Bait
Talon-G Rodenticide Bait Packs
Talon-G Rodenticide Pellets
Talstar
Talstar Lawn & Tree
Talstar PL Granular
Tanglefoot
Tempo SC Ultra Insecticide
Tempo Ultra
Tempo 2
Tempo 20 WP
Terro Ant Killer II
Tordon K
Triad
Tri-Die
Trimec Herbicide
Turflon
ULD BP 100
ULD BP-300 Insecticide
Vengeance Rodenticide Bait
Wasp Freeze
Weatherblok Rodenticide Bait

Pesticide Active Ingredients Listed on Returned Hospital Surveys:

2,4-D
2-2 methyl-4-propionic acid
4-aminopyridine
abamectin
acephate
atrazine
Bacillus thuringiensis

bendiocarb
bifenthrin
borax
boric acid
brodifacoum
bromadiolone
bromethalin
calcium polysulfide
carbaryl
chlorophacinone-liphadione
chlorpyrifos
cholecalciferol
clopyralid
cyfluthrin
cypermethrin
deltamethrin
diazinon
dicamba
dichlobenil
diphacinone
disodium octaborate tetrahydrate
d-trans allethrin
esfenvalerate
eugenol
fipronil
glyphosate
halosulfuron-methyl
hydramethylnon
hydroprene
imidacloprid
isoxaben
lambda-cyhalothrin
malathion
mancozeb
mecoprop
mefenoxam
metaldehyde
methomyl
methoprene
metolachlor
MSMA (monosodium acid methane arsonate)
muscalure
n-octyl bicycloheptene dicarboximide
ortho-benzyl-para-chlorophenol
oryzalin
oxadiazon
oxyflurfen
pelargonic acid
permethrin
petroleum hydrocarbon
phenothrin
phenylethyl propionate
picloram
piperonyl butoxide
polybutenes
potassium salts of fatty acids
prodiamine
propoxur
pyrethrin
refined petroleum oil
s-bioallethrin
sethoxydim
silica gel
sodium chlorate
sodium salt of bentazon
spinosad
sulfuramid
thiophanate methyl
triadimefon
triclopyr
trifluralin
(z)-9-tricosene
zinc chloride

VI. ENDNOTES

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