

Healthy Hospitals

Controlling Pests Without Harmful Pesticides

Written by Kagan Owens, Beyond Pesticides

A REPORT BY



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The following are excerpts from the report *Healthy Hospitals: Controlling Pests Without Harmful Pesticides* (November 2003), released by *Beyond Pesticides* and *Health Care Without Harm*, which finds that many major hospitals are regularly spraying toxic pesticides, unnecessarily risking the health of patients, staff and visitors. It is incredibly counterproductive that people go to receive treatment for illnesses such as cancer and neurological disease at hospitals that unnecessarily use carcinogenic and neurotoxic pesticides. This report also signals the necessity of protecting the elderly and other sensitive populations. According to EPA, "The elderly may be more susceptible to the health effects of certain pollutants than other age groups. If the elderly are more vulnerable, and the numbers of older people increase, then it follows that many more people could be affected by environmental contaminants."¹ Aging individuals are at risk of chronic diseases and disabling conditions that may be caused or exacerbated by pesticides.²

There is an urgent need for more hospitals to protect people's health by using safer pest management practices, in keeping with the medical profession's commitment to "First, do no harm." *Healthy Hospitals* includes a first-of-its-kind survey of top U.S. hospitals and offers tips and resources for how hospitals can manage pests while also protecting the health of people and the environment.

It is important to note that although the report does not address sterilants and disinfectants (antimicrobials), their use is a concern. EPA's website states that antimicrobial use does "involve risks of potential efficacy failure and exposure hazards." And a study published in the October 2003 issue of *Environmental Health Perspectives* finds that youth face a four-fold increased risk from occupational exposure to disinfectants than adults.

The report is available at www.beyondpesticides.org or from *Beyond Pesticides*. —KO and JF

Introduction

Hospitals are intended to be places for health and healing. Yet the findings of a new survey of top U.S. hospitals indicate that many 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) surveyed top U.S. hospital facilities. 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).

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."³

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 non chemical alternative."⁴

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, pesticides can exacerbate asthma and cause acute adverse effects in humans, such as 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.⁵ that see about 32 million inpatients, 83 million outpatients and 108 million emergency room patients per year.⁶ 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.⁷ Hospitals have a special obligation to demon-

strate 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.

Hospital pesticide use survey findings

HCWH distributed a *Hospital Pesticide Use Survey* to the top 171 hospitals listed by the *U.S. News and World Report* in 2001. Twenty-two hospitals (13%) responded to the survey. Although this was a relatively low response rate, the results were

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.

Examples of Hospital IPM Programs Featured in Healthy Hospitals

Veterans Hospitals
Oregon Health and Science University
San Francisco General Hospital
Massachusetts General Hospital
Brigham and Women's Hospital
Hackensack University Medical Center

consistent with reported pesticide use in New York hospitals,⁸ schools and other public buildings and grounds. It also highlights the fact that it is often very difficult to obtain information about pesticide usage in any location.

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.

Hospital IPM Programs. While the returned surveys indicate that the majority (73%) 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.

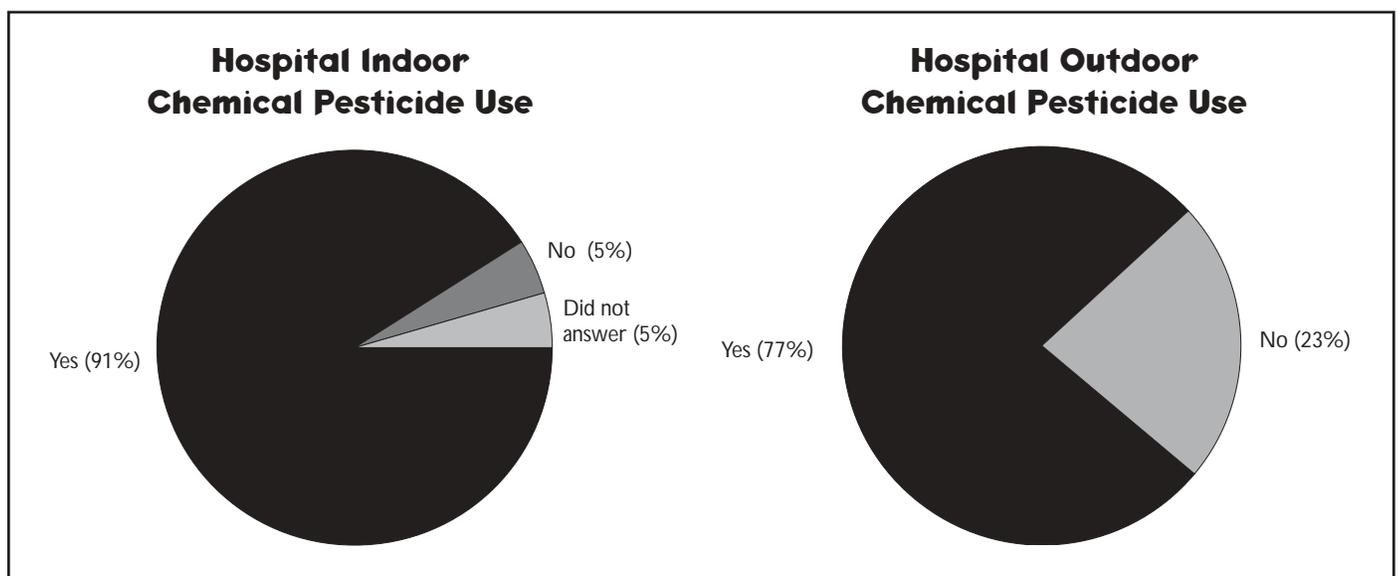
Hospital Pesticide Use. Although one responding hospital (5%) does not use chemical pesticide indoors and two other hospitals (9%) do not use chemical pesticides outdoors, all of the responding hospitals use chemical pesticide products either on their grounds, inside their buildings or both. Not one of the surveyed hospital's pest management programs is 100% free of chemical pesticides. 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.

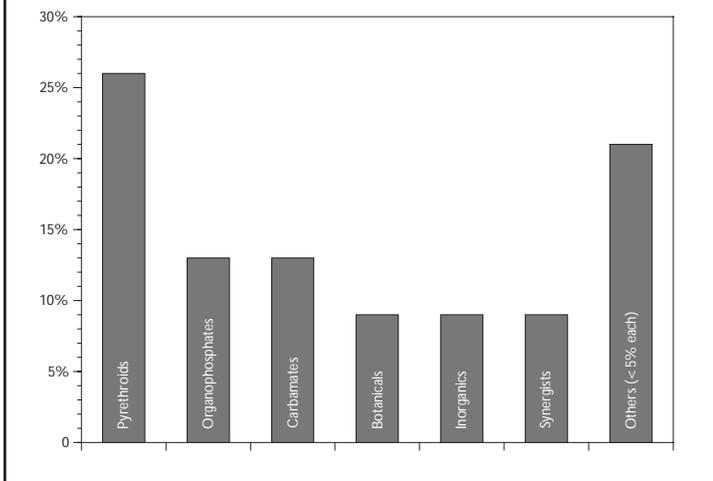
Of the 37 most commonly used pesticides (active ingredients) identified from the hospital survey responses:

- 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 botani-



Surveyed Hospitals Most Commonly Used Insecticides, By Chemical Family



cals; 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 commonly used pesticide active ingredients by surveyed hospitals.

Of the 37 most commonly used pesticides by surveyed hospitals:

- 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 us-

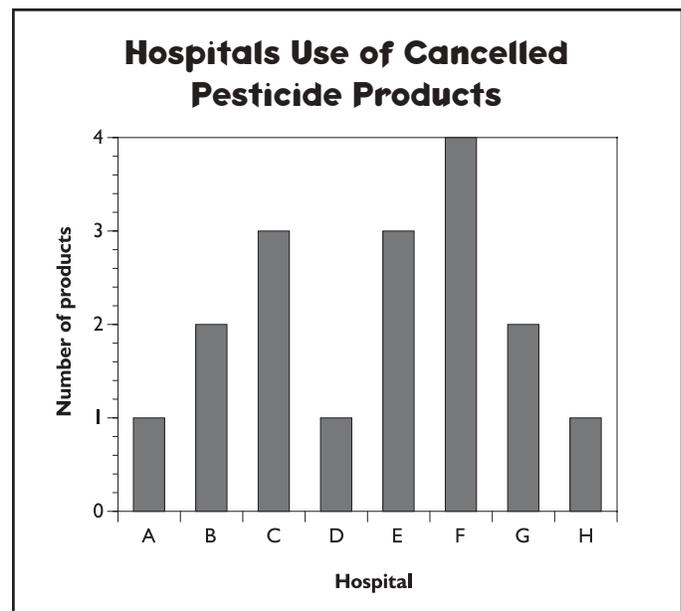
ing one or more pesticide product containing boric acid. Boric acid, an inorganic chemical, is a non-volatile mineral with insecticidal, fungicidal and herbicidal properties. Because of its extremely low volatility, it has long been embraced as a safer alternative to highly volatile synthetic chemical 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.⁹ Also, pyrethrins are often formulated with toxic “synergistic” chemicals, including piperonyl butoxide, that pose their own risks.

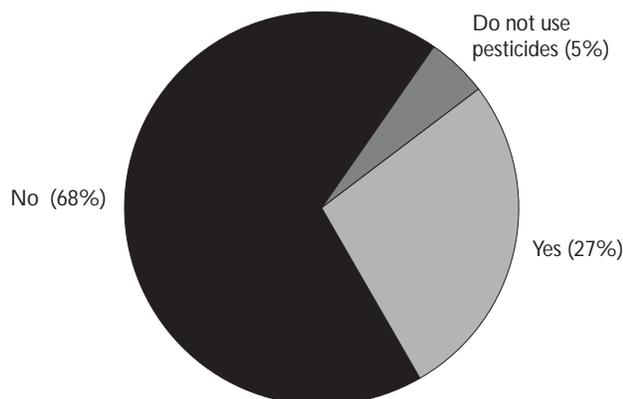
Hospital Use of Cancelled Pesticide Products and Active Ingredients. From time to time, the registration of a pesticide or certain uses of the product are “cancelled” by EPA or withdrawn from use by the manufacturer. Cancelled products are often phased-out over time, allowing individuals to use the products they have already purchased until existing stocks are depleted. 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.¹⁰

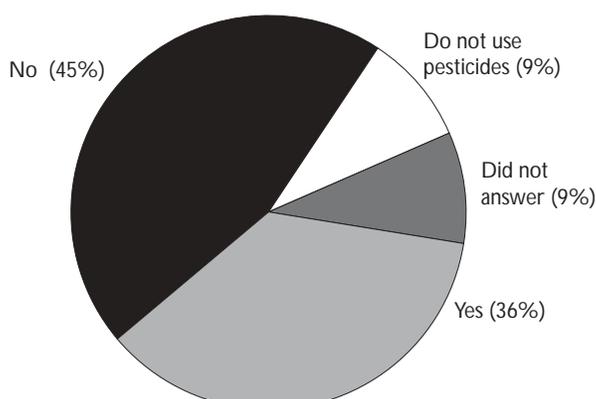
Hospitals Use of Cancelled Pesticide Products



Hospitals Posting Indoor Pesticide Notification Signs



Hospitals Posting Outdoor Pesticide Notification Signs



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.

While these cancellations are for the pesticide product and not for the product's active ingredient, the active ingredients bendiocarb, chlorpyrifos and diazinon 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 due to the fact that they pose unacceptable health risks.¹¹ While the use of products containing these active ingredients are 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.

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.

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 individuals notice 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.

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. 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.

Safer pest management practices

Many hospital occupants are especially vulnerable to pesticides and 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.

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 po-

Health Care Community Supports IPM

American Hospital Association Certification Center 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 ..."¹²

American Society for Healthcare Environmental Services published *Integrated Pest Management* for their Professional Development Series, which 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."¹³

American Society for Healthcare Engineering (ASHE) has developed a Sustainable Design Award recognition program, which includes the recommendation to use IPM practices.¹⁴

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 healthcare systems, including the adoption of IPM.¹⁵

tential 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. On hospital grounds, unhealthy lawns and landscape and/or poor soil conditions foster weed growth and insect infestations.

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 ex-

ample, 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.

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 to minimize 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 non-chemical 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. The least hazardous pesticide is used only as a last resort. 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. 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 grounds and maintenance. 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.

Recommendations

While some hospitals use 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 pest management industry can all take action to increase the number of hospitals adopting least hazardous IPM programs.

A Closer Look at San Francisco General Hospital's IPM Program

Interview with Deanna Simon, Toxics Reduction Specialist,
San Francisco Department of the Environment

What are the main pest problems you needed to solve?

The main problems at San Francisco General Hospital (SFGH) are ants, rodents and pigeons.

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. 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 clip-

pings 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 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.

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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.

In the calendar years 2001 and 2002, what were your expenses for pesticides and pesticide application?

SFGH pays \$1700 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 Fran-

cisco 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 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 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. Don't try to re-invent the wheel!

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Endnotes

- 1 U.S. EPA. 2003. Tackling a Suspected Hazard of Aging. <<http://www.epa.gov/ord/archives/2003/september/htm/article1.htm>>.
- 2 U.S. EPA. 2002. "EPA Announces New Aging Initiative to Protect Older Persons From Environmental Health Threats." EPA Pesticide Program Update 10/31/02. Office of Pesticide Programs.
- 3 Department of Veterans Affairs. 1986. Pest Management Operations, Chapter 2. Environmental Management Service. February 3. p.5.
- 4 American Medical Association, Council on Scientific Affairs. 1997. "Educational and Informational Strategies to Reduce Pesticide Risks." Prevention Magazine 26:191-200. < <http://www.ama-assn.org/ama/pub/article/2036-2492.html>>.
- 5 American Hospital Association. 2001. Fast Facts on U.S. Hospitals from Hospital Statistics™. Chicago, IL.
- 6 CDC. 2002. "Hospital Utilization." National Center for Health Statistics. Center for Disease Control and Prevention. U.S. Department of Health and Human Services. Hyattsville, MD.
- 7 Vacco, D. 1995. Pest Management in New York State Hospitals: Risk Reduction and Health Promotion. Attorney General of New York State. New York State Department of Law. December 5; Duerhing, C. 1996. The Healthy Hospital Part Two: Pesticide Risks and Alternatives. Medical and Legal Briefs 2(1) July/August.

- 8 Vacco, D. 1995.
- 9 U.S. EPA. 2002. Chemicals Evaluated for Carcinogenic Potential.
- 10 U.S. EPA. 2003. Restricted and Cancelled Uses. Office of Pesticide Programs. <<http://www.epa.gov/pesticides/regulating/restricted.htm#canceled>>.
- 11 U.S. EPA. 2001. Diazinon Revised Risk Assessment and Agreement with Registrants. Office of Prevention, Pesticides and Toxic Substances. Washington DC. <<http://www.epa.gov/oppsrrd1/op/diazinon/agreement/pdf>>; U.S. EPA. 1999. Reregistration Eligibility Document Facts: Bendiocarb. Office of Prevention, Pesticides and Toxic Substances. Washington DC. <<http://www.epa.gov/oppsrrd1/REDS/factsheets/0409fact.pdf>>; U.S. EPA. 2000. Chlorpyrifos Revised Risk Assessment and Agreement with Registrants. Office of Prevention, Pesticides and Toxic Substances. Washington DC. <<http://www.epa.gov/oppsrrd1/op/chlorpyrifos/agreement.pdf>>.
- 12 American Hospital Association. 2000. Certified Healthcare Environmental Services Professional: Candidate Handbook. American Hospital Association Certification Center. Chicago, IL.
- 13 American Society for Healthcare Environmental Services. 2000. Integrated Pest Management (IPM). Professional Development Series. American Hospital Association. Catalogue No. 197107. June.
- 14 American Society for Healthcare Engineering. <<http://www.hospitalconnect.com/ashe/recognition/sustainable.html>>.
- 15 Hospitals for a Healthy Environment. 2002. <<http://www.h2e-online.org/tols/chem-ipm.htm>>.