Pesticides in hospitals: a dangerous trend

The privatisation of the healthcare sector has witnessed a much greater effort to keep hospital environs clean and germ-free. This is largely done through the use of pesticides and chemical disinfectants.

In most places the use of these chemicals is supervised by the sanitation staff, who, unfortunately, are not trained about the harmful effects that these chemicals can cause, if used indiscriminately.

The health of patients and staff is at risk from a variety of pesticides that are regularly applied in kitchen and cafeteria, patient rooms, public areas and offices in the hospitals. People may be exposed to these pesticides without being informed and thus cannot take necessary precautions to avoid unwanted exposure. Pesticide use in hospitals may be of particular concern because exposure to pesticides is potentially more dangerous for children, the elderly and the infirm.

What are pesticides?

Pesticides are poisons designed to kill a variety of weeds, molds, fungi and insects. They are also used as wood preservatives. Pesticides contain active ingredients (chemical compounds designed to kill the target organisms) and inert ingredients, which could be carcinogenic and toxic.

Pesticides can be absorbed in the human body through the skin, ingestion or inhalation. More serious effects appear to be produced by direct inhalation of pesticide sprays than by absorption or ingestion of toxins. During application pesticides drift and settle on ponds, laundry, toys, pools and furniture.

The World Health Organization (WHO) estimates that every year there are one million pesticide poisoning cases and 20,000 deaths resulting from exposure to them globally.

Even a relatively low-level exposure to pesticides, occurring at critical stages of development, can cause permanent damage to children’s developing bodies.

Integrated Pest Management helps a hospital to prevent and manage pest problems in the least hazardous manner.

Hospitals should make pest management a central administrative function and put down their pest management policy in writing.
Pesticides can cause various health problems such as birth defects, nerve damage, cancer, and other effects that might occur over a long period of time. Foetuses, infants, and children are more vulnerable than adults to the health threats posed by toxins. Even a relatively low-level exposure to pesticides, occurring at critical stages of development, can cause permanent damage to children’s developing bodies. It has been found that children whose homes and gardens are treated with pesticides have a 6.5 times greater risk of leukemia than children living in untreated environments.

Health risks include:
- Cancers (lung, brain, testicular, lymphoma)
- Spontaneous abortions
- Genetic damage
- Decreased fertility
- Liver and pancreatic damage
- Neuropathy
- Disturbances to immune systems resulting in asthma and allergies
- Stillbirths
- Decreased sperm counts

Major concerns

**Synergistic effects:** Simultaneous exposures to these pesticides frequently cause synergistic effects, where toxicities of individual toxins present can be vastly magnified. People are exposed to more than one variety of pesticide and each pesticide can contain more than one harmful chemical.

**Unlisted inert ingredients:** Many people will conclude from the term ‘inert’ that such ingredients could not possibly have any adverse health or environmental effects. The truth is that the chemicals used as inerts include some of the most dangerous substances known. Benzene, for example, is used as an inert ingredient but is a known carcinogen. Some inerts have also been linked to long-term health problems like central nervous system disorders, liver and kidney damage and birth defects. They can also cause short-term health effects like eye and skin irritation, nausea, dizziness and respiratory difficulty.

- They can comprise up to 97% of products like weed killers.
- These so called inerts are often insecticides such as DDT or contaminants such as dioxin.
- ‘Inerts’ may be even more toxic than the active ingredients, which are listed on the labels.
- Applicators do not know the danger of their product because they don’t know the identity of the inert ingredients.

**Pesticide-use survey of Toxics Link**

We conducted a pesticide-use survey in five hospitals in Delhi to understand the issue better. The survey included questions related to the use of chemical pesticides, methods of notifying the staff, patients and the public of pesticide application and Integrated Pest Management (IPM).

The survey revealed that 80% of the hospitals surveyed used chemical pesticides and hired an outside contractor to do the job. These hospitals used pesticides routinely without examining the need for them. Only two hospitals claimed to follow Integrated Pest Management practices. None of the hospitals had any pest management plan or policy. They do not post any warning or notification signs for the staff or patients or the general public when these pesticides are being applied. No records are maintained about the type and quantity of pesticide being used in the hospital. Worse still, most of the hospitals were not aware of the correct method for pesticide application.

One of the hospitals had adopted a completely herbal pest control method. It was revealing to find out that their cockroach infestation problem had been completely solved. The cost, when compared to chemical pesticides, was a lot more but in the long run it turns out to be cost effective.

**Commonly used classes of pesticides**

<table>
<thead>
<tr>
<th>Name</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrethroids</td>
<td>42</td>
</tr>
<tr>
<td>Carbamate</td>
<td>29</td>
</tr>
<tr>
<td>Organophosphate</td>
<td>13</td>
</tr>
<tr>
<td>Coumarin</td>
<td>8</td>
</tr>
<tr>
<td>Pyrazole</td>
<td>4</td>
</tr>
<tr>
<td>Inorganic zinc</td>
<td>4</td>
</tr>
</tbody>
</table>

**Methods of application of pesticides**

<table>
<thead>
<tr>
<th>Method</th>
<th>Applied to no.of pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spray</td>
<td>18</td>
</tr>
<tr>
<td>Bait</td>
<td>4</td>
</tr>
<tr>
<td>Fogging</td>
<td>1</td>
</tr>
<tr>
<td>Gel</td>
<td>1</td>
</tr>
</tbody>
</table>
The focus of Integrated Pest Management is to prevent pest problems by reducing or eliminating sources of pest food, water, and shelter in a hospital and its adjoining grounds by maintaining healthy landscapes.

When the chemicals were ranked by their class, pyrethroids were first, followed by carbamates and organophosphates (for example, chlorpyrifos).

As a group, the organophosphates are known to be neurotoxic. Pyrethroids and n-methyl carbamates (for example, bendiocarb) are also neurotoxic.

The most common method of application is spraying which accounts for the maximum risk of exposure to these chemicals.

Integrated Pest Management (IPM)

Integrated Pest Management helps a hospital to prevent and manage pest problems in the least hazardous manner. However, IPM is a term that is used loosely with many different definitions and methods of implementation. It is not uncommon, for example, to find that a traditional pesticide spray program being referred to as IPM.

In reality, the focus of IPM is to prevent pest problems by reducing or eliminating sources of pest food, water, and shelter in a hospital and its adjoining grounds by maintaining healthy landscapes. The first approach to controlling a pest outbreak is improving sanitation, making structural repairs (such as fixing leaky pipes and cracks) and using physical or mechanical controls such as screens, traps and weeders. If a pesticide is used, the hospital community must be notified prior to the application in order to take necessary precautions.

Key elements of IPM are:

- Pest prevention
- Monitoring
- Education
- Record keeping
- Least hazardous approach to pest control
- Pesticide use notification

IPM techniques

These help in eliminating food for the pest, restricting their entry and controlling the habitat. This is achieved through:

- Sanitation
- Vacuuming
- Pest-proofing waste disposal
- Structural maintenance
- Mechanical traps

Eliminate routine spraying

- Instead, have a contractor or staff perform a pest inspection on a monthly or quarterly basis to determine whether pests are present and whether action is needed.
- When taking action, use the least toxic method that will effectively suppress or eliminate pest populations.

Alternatives

Few alternatives to chemical control are:

- Biological controls
- Boric acid and pyrethrum formulations
- Sticky traps
- Silica gel
- Vaccums

It is only recently that pest management has become virtually synonymous with the use of chemical pesticides. This unsustainable trend needs to be reversed. Ecological methods of pest control must replace the risky over dependence on chemicals.

Facts about pesticides

- Indian scientists have been studying neem for nearly 70 years and had isolated some active compounds by 1960.
- Aerosol spray solutions cause toxicity when the ingredients are absorbed through lungs.
- Biological products for pest control may well account for 50% of the market in the next decade.
- Natural enemies are capable of reducing 60% of the pest population.
- 87% of the milk samples collected from different mothers in Delhi were contaminated with HCH (Hexachlorocyclohexane).
- Every year about 10,000 people die and nearly 400,000 suffer from various effects of pesticide poisoning in developing countries.

Labels for pesticide containers

Every pesticide container carries certain information on its label which includes the trade name, technical name, composition, manufacturer’s address, registered uses, date of packing, date of expiry and toxicity label. This is mandatory under the Insecticide Act, 1968.

Pesticide toxicity warning label

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.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Beds</th>
<th>Method</th>
<th>Cost/month (Rs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1,000</td>
<td>Chemical</td>
<td>8,000</td>
</tr>
<tr>
<td>B</td>
<td>600</td>
<td>Herbal</td>
<td>34,000</td>
</tr>
<tr>
<td>C</td>
<td>360</td>
<td>Chemical</td>
<td>NA</td>
</tr>
<tr>
<td>D</td>
<td>300</td>
<td>Chemical</td>
<td>5,000</td>
</tr>
<tr>
<td>E</td>
<td>18</td>
<td>Chemical</td>
<td>3,417</td>
</tr>
</tbody>
</table>
### Categorisation of pesticides

#### Visual depiction

<table>
<thead>
<tr>
<th>Colour of lower triangle</th>
<th>Toxicity class</th>
<th>Oral LD50 value* (mg/kg)</th>
<th>Signal words (upper half)</th>
<th>Warning words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bright red</td>
<td>Extremely toxic</td>
<td>&lt; 50</td>
<td>Poison (in red)</td>
<td>Keep out of reach of children. If swallowed or symptoms of poisoning occur, call a doctor.</td>
</tr>
<tr>
<td>Bright yellow</td>
<td>Highly toxic</td>
<td>51-500</td>
<td>Poison (in red)</td>
<td>Keep out of reach of children.</td>
</tr>
<tr>
<td>Bright blue</td>
<td>Moderately toxic</td>
<td>501-5000</td>
<td>Danger</td>
<td>Keep out of reach of children.</td>
</tr>
<tr>
<td>Bright green</td>
<td>Slightly toxic</td>
<td>&gt; 5,000</td>
<td>Caution</td>
<td>–</td>
</tr>
</tbody>
</table>

(T HIS IS HOW THE WARNING LABELS SHOULD APPEAR ON THE CONTAINERS)

*LD50 value means the dose of the pesticide (active ingredient) required to kill 50% of the test population, generally rats, when orally treated, and is expressed as mg/kg of the body weight. Lesser the LD50 value more toxic the pesticide is and vice versa.

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 affected acutely from exposures to pesticides which carry a low acute toxicity rating.

### Recommendations

- Hospitals should adopt IPM practices in order to reduce or eliminate pesticide use.
- If pesticides are used, hospitals should notify all members of the hospital community in advance. Warning signs should be posted around the treated area before and after pesticides are applied.
- All hospitals should maintain detailed information about what pesticides are being applied, where, how, why and by whom.
- Hospitals should put down their pest management policies in writing.
- Hospitals should make pest management a central administrative function. Senior people should monitor this instead of it being a routine activity and left to class IV employees.
- If using an outside contractor, a hospital should make contract specifications clear and unambiguous.

### References

2. [http://www.chebucto.ns.ca/Environment/RATE/1](http://www.chebucto.ns.ca/Environment/RATE/1)

Compiled and written by Yamini Sharma with inputs from the Toxics Free Health Care team