

### 3. CASE ASCERTAINMENT



## 3. CASE ASCERTAINMENT ■

### 3.1 INTRODUCTION

**S**everal possible sources for pesticide poisoning case reports exist. Ideally, all of these sources should be used for timely identification of cases. However, if resources are limited, a single type of case ascertainment method may be chosen, supplemented by a periodic survey to review data from other sources.

### 3.2 POISON CONTROL CENTERS (PCCs)

PCCs may function at a regional or statewide level. They receive calls from HCPs and the general public. The main function of PCCs is to provide toxicologic and case management information. Calls may be purely informational, but they commonly involve guidance on management of an acute ingestion or other acute exposure. PCCs often follow up cases until there is a final outcome, especially when there is a possibility that a person is at risk of more than minor adverse health effects. This follow-up information is used to determine the severity of the health effect. PCCs collect a variety of information including demographic data, the route of exposure, whether exposures were intentional, the site of exposure, case management, the therapy received, clinical effects by organ system, and medical outcome.

PCCs are an important source of case reports, especially for nonoccupational pesticide poisonings. As mentioned in Section 2.5.1.2, it may be helpful to list them specifically as reporters in the reporting statute or rules. The mechanisms and requirements for reporting

should be discussed with the PCC prior to proposing language. Prompt reporting of cases by the PCC allows the surveillance program to act quickly to prevent additional exposures and illnesses from occurring.

The reporting guidelines shown in Visual 3.1 are useful according to State surveillance programs working with PCCs. Two data management software programs (Dotlab and TOXICALL<sup>®</sup>) commonly used by PCCs have developed customized reporting capabilities to facilitate reporting to PPSPs. These modifications include the capacity for real-time reporting to PPSPs. See Appendix C for instructions on obtaining case reports from PCCs, including a listing of the pesticide substance codes used by PCCs and information about search strategies for PCC data. PCCs can also assist reporting by physicians who call for advice on diagnosis and management of acute pesticide poisoning. The PCC can inform the HCP about the State reporting requirement and the PCC can offer to report the case. If the HCP agrees, the PCC may need to obtain additional patient information to satisfy the data reporting requirements (e.g., patient name and contact information).

Many PCCs have often struggled to maintain the funding required to remain open. In many States, PCCs receive financial support from the State department of health, which should facilitate the creation and maintenance of a reporting arrangement between the PPSP and the PCC. In States in which the department of health does not provide funding support to the PCC, the PPSP should consider making financial arrangements with the PCC. This will foster a

### VISUAL 3.1. USEFUL REPORTING GUIDELINES FOR POISON CONTROL CENTERS (PCCs)

(Adapted from criteria used by Florida Department of Health)

PCCs should report systemic pesticide poisonings (classic toxicosis) and those involving local responses (dermatitis, ocular effects, etc.) as well as reactions due to unpleasant pesticide formulation odors, pesticide product explosions, and allergic reactions. If an event consists of multiple cases, be sure to report information about each case. If Pesticide Poisoning Surveillance Program (PPSP) resources are limited, it may want to restrict PCC reports to the following cases involving pesticide exposures:

1. All occupational cases (that is, anyone with illness or injury associated with exposure to pesticides while he/she was at work):
  - Including farmworkers, farmers, and pesticide handlers/applicators (pest control operators, golf course superintendents/technicians, pesticide manufacturing workers, etc. even when self-employed);
  - Including office workers, teachers, construction workers, or persons employed in residential settings (home offices, residential service workers, etc.).
2. All serious cases, such as those resulting in death, hospitalization, or physician diagnosis of a poisoning (this includes attempted suicides).
3. All cases involving HCP-initiated calls in which the HCP describes clinical signs, or situations when callers are advised to seek medical attention. (Clinical signs can be systemic or local, including miosis, rash, conjunctivitis, dyspnea, etc.)
4. All cases, of any type, involving more than one person. This is intended to capture reports of mass poisonings in residential neighborhoods, schools, etc., where many people are reporting exposure-related illnesses due to a common source.
5. All cases involving exposure to public spraying of pesticides (e.g., medfly spraying, mosquito spraying, etc.), where the patient is symptomatic (even if there is only a suspicion that symptoms are related to the exposure).
6. Any other situation not covered here but considered eligible for a report by the PCC Director/Assistant Director.

stronger collaboration between the two agencies and will allow both agencies to better meet their obligations.

PCC data, stripped of individual identifying information, are aggregated into a national database by the AAPCC. This database (TESS) contains information about millions of poison exposures reported to certified PCCs in the United States. An annual report is published in the September issue of the *American Journal of*

*the Emergency Medicine*. The annual report includes information about all toxic agents, not just pesticides. Additional AAPCC contact information appears in Appendix G. PCCs do not systematically collect detailed information about occupational cases (e.g., information is not collected on the worker's industry, occupation, or factors that led to the worker's exposure). Work-related information may be embedded in the narrative but is difficult to extract and is inconsistent when present.

### 3.3 WORKERS' COMPENSATION DATA

Workers' compensation claims can be a valuable source of information about occupational pesticide poisoning cases. States vary in coverage of agricultural workers by workers' compensation regulations (see Appendix G). In addition, thresholds for claim acceptance (that is, the level of documentation required, or type of illness/exposure) vary among the State workers' compensation systems.

The data collected by State workers' compensation programs vary widely, as does the accessibility of the data. States interpret the confidentiality of this information somewhat differently; therefore, access may be as simple as requesting a routine data transmission of the desired subset of variables, or may require development of a formal interagency agreement. If a surveillance program wishes to use workers' compensation data as a primary source of cases, this may require developing a formal agreement that allows the surveillance program early access to *submitted* claims data, including prompt access to hard copy or electronic physician reports. Including language in the reporting rule to permit access to the workers' compensation *submitted* claims data may be useful. Evaluation of these data on a monthly, quarterly, or annual basis will also permit a surveillance program to evaluate the completeness of reporting for occupational cases from other reporting sources. It may also provide information about a particular industry, demographic group, or type of exposure that is not reported through other sources.

It is preferable to obtain submitted claims data for both medical-only (these claims seek reimbursement of medical expenses only) and lost-time cases (claims that seek reimbursement for medical expenses and to recover lost wages). There are important reasons for gaining access

to submitted claims versus *accepted* claims. The first reason involves timeliness. Workers' compensation claims are often submitted within hours or days of a pesticide exposure. However, it may be several weeks or months before the claim is accepted. Another issue is sensitivity. Although many submitted claims may be rejected, these rejected claims may meet the surveillance program's case definition for acute pesticide-related illness or injury. Access to submitted claims will allow the surveillance program to identify a larger proportion of the total universe of cases. One disadvantage is that some rejected claims are truly not cases of acute pesticide-related illness or injury. The surveillance program will expend some resources on following up on these claims that ultimately fail to meet the case definition. Visual 3.2 lists search strategies that some States have found useful when reviewing workers' compensation data. Additional approaches using nature of injury codes and international classification of disease codes (ICD) (e.g., ICD9 and ICD10 codes) may also be used, although this type of strategy is more useful when examining accepted claims data, due to the timing of when these codes are entered in the system. ICD9 and ICD10 codes that are useful for identifying pesticide poisoning cases are listed in Table 3.1.

### 3.4 HEALTH CARE PROFESSIONALS (HCPs)

Physician (or, more broadly, HCP) reporting is the most common source of cases mentioned in reporting rules/statutes. While this method has been the mainstay of many communicable disease and notifiable condition reporting systems, it is not necessarily the most effective method for surveillance of pesticide poisoning. The nonspecific nature of symptoms arising from many pesticide exposures, difficulties of diagnosis, rare occurrence within an individual

**Table 3.1. ICD–9 and ICD–10 codes to use when reviewing hospital discharge, emergency department, and workers' compensation data**

<b>ICD–9 Code</b>	<b>Condition*</b>
989.0	Toxic effect of hydrocyanic acid and cyanides
989.1	Toxic effect of strychnine and salts
989.2	Toxic effect of chlorinated hydrocarbons
989.3	Toxic effect of organophosphate and carbamate
989.4	Toxic effect of other pesticides, not elsewhere classified
E861.4	Accidental poisoning by disinfectants
E863.0	Accidental poisoning by insecticides of organochlorine compounds
E863.1	Accidental poisoning by insecticides of organophosphorus compounds
E863.2	Accidental poisoning by carbamates
E863.3	Accidental poisoning by mixtures of insecticides
E863.4	Accidental poisoning by other and unspecified insecticides
E863.5	Accidental poisoning by herbicides
E863.6	Accidental poisoning by fungicides
E863.7	Accidental poisoning by rodenticides
E863.8	Accidental poisoning by fumigants
E863.9	Accidental poisoning by other and unspecified pesticides
E950.6	Suicide and self-inflicted poisoning by agricultural and horticultural chemical and pharmaceutical preparation other than plant foods and fertilizers
E980.7	Agricultural and horticultural chemical and pharmaceutical preparations other than plants, foods, and fertilizers
<b>ICD–10 Code</b>	
T60.0	Toxic effect of organophosphate and carbamate insecticides
T60.1	Toxic effect of halogenated insecticides
T60.2	Toxic effect of other insecticides
T60.3	Toxic effect of herbicides and fungicides
T60.4	Toxic effect of rodenticides
T60.8	Toxic effect of other pesticides
T60.9	Toxic effect of pesticide, unspecified
X48	Accidental poisoning by and exposure to pesticides
X68	Intentional self-poisoning by and exposure to pesticides
X–87	Assault by pesticides
Y–18	Poisoning by and exposure to pesticides

\*Note: ICD–10 does not have specific codes for disinfectants. To find disinfectant poisonings, try T54, X49, X69, X86, and Y19, which are codes for corrosive and noxious substances. (Source: WHO [1977, 1992].)

**VISUAL 3.2 USEFUL SEARCH STRATEGIES TO IDENTIFY PESTICIDE POISONING CASES FROM WORKERS' COMPENSATION DATA**

In some States, the narrative portion (injured worker and/or physician statement[s]) of workers' compensation claim data may be searched using a computer; in others, the narrative is not entered into the data system.

- For electronic searches, the following terms have been found useful: \*cide, spray\*, fumig\*.
- If physician narratives are screened, adding the terms organophosphate, \*cholinesterase, 2-PAM, or atropine may yield additional cases.
- If the data are being reviewed manually, additional search parameters include pesticide product names and all chemical exposures to agricultural workers, landscapers, maintenance workers, structural pest control operators, workers in pesticide and agricultural chemical manufacturing, and swimming pool service workers (this last occupation only if disinfectants are included in the surveillance system). Reports describing an agricultural worker with systemic or respiratory symptoms or a nonmechanically caused eye or skin injury should also be reviewed.

practice, lack of timely laboratory testing, selection of inappropriate tests, and reluctance to report cases make HCP reporting less reliable for this condition. Despite broadly worded reporting guidelines, HCPs are often reluctant to report cases for one or more reasons, including discomfort with reporting clinically unconfirmed cases, concern that an affected worker may experience job loss, perceptions that pesticide exposures are unlikely to cause illness, ignorance about the reporting requirement, and concern that reporting a case might disrupt any personal relationships with the employer.

All States with HCP-based reporting systems have conducted at least some level of HCP education to enhance reporting. Educational presentations on pesticide poisoning recognition and management provide HCPs with tools for recognizing the condition and understanding the reporting and case investigation process. Educational modalities include written case reporting guidelines, periodic case presentations in a health department or medical society publication, continuing medical education (CME)

seminars (whole- or half-day), grand rounds presentations, tapes, videos, teleconferences, and Internet educational tools. As a mechanism for maintaining ongoing awareness that pesticide-related illness is a reportable condition, case vignettes and program updates can be included in a regular epidemiology publication sent to HCPs. Some combination of these different modalities can help maintain HCP awareness of the reporting requirements and astuteness in diagnosing potential cases. Any gains in HCP reporting associated with the implementation of these educational outreach efforts will be maintained only if the efforts are ongoing. Evaluation of educational programs can help a program fine tune their efforts. Evaluation tools include pre- and post-testing and examining whether attendees report cases within 1 year of training. Another approach is to compare the number of reports within a 3- or 6-month period after a large scale educational program, compared with the number of reports during the same time period in the previous year (comparing similar months will help account for seasonal variation in reporting).

Close linkages to a variety of expert resources are an additional enticement for HCP reporting. Providing contacts with clinical toxicologic expertise (e.g., through the local poison center, a university, the EPA, etc.), laboratory resources, or on-site sampling to help in the differential diagnosis can serve as an added incentive for reporting.

Selection of sentinel HCPs for more active reporting is a labor intensive process, yet may yield a number of cases that may not be identified through other reporting sources. The types of HCPs that are likely to yield the greatest number of cases include migrant health clinics, county health clinics, dermatologists, and emergency departments serving rural areas. Pesticide manufacturing or reformulation facilities may have contract medical staff who can also be contacted. Sentinel HCPs can be contacted to ascertain cases on a weekly or monthly basis, either in writing or via telephone.

### 3.5 REFERRAL FROM OTHER AGENCIES

Other government agencies receive reports of pesticide-related illness and can be valuable sources for case finding. The obvious agencies include the following departments: agriculture, forestry, environmental quality, and the State Occupational Safety and Health Administration (OSHA) program. The number of case reports and validity of cases from these sources varies. Setting up good working relationships with the agencies and clearly defining the situations that warrant referral to the surveillance program are beneficial. A centralized emergency response program within the State, if there is one, can also be a source of case referrals. The regional EPA office sometimes receives complaints from the public, making it helpful to provide regional EPA staff with a description of the PPSP and guidelines for the types of reports that should

be referred. Similar information can be provided to other Federal agencies with local jurisdiction that may be willing to refer cases, such as OSHA, the Department of Transportation, the Federal Railway Administration, and the Coast Guard.

Within the State health department, other programs with overlapping responsibilities for investigation may exist. Programs that are responsible for surveillance of hazardous substance spill or release events will usually also collect information about pesticide-related events. Drinking water and well testing programs, as well as indoor air quality programs, may receive complaints of human illness associated with pesticide exposure. It is important to develop mechanisms to coordinate with these programs.

### 3.6 EMERGENCY DEPARTMENT LOGS

Data are not recorded in any standardized fashion across hospital emergency departments and review of log information can be labor intensive. Despite their limitations, these data can be useful tools in developing or evaluating a pesticide poisoning surveillance system. Particular regional emergency departments may be useful as sentinel reporting sites. Periodic reviews of selected emergency departments' log data within a State, or smaller geographic area can be used to supplement surveillance data obtained from other case ascertainment methods. If emergency department records are available in electronic format, it may be useful to search these for the ICD9 and ICD10 codes provided in Table 3.1.

### 3.7 AFFECTED PERSONS

More than half of the existing PPSPs accept initial reports from affected persons. The surveil-

lance program often encourages these persons to seek medical attention. In some situations, the person may have already seen an HCP, but the HCP chose not to report. If this situation arises, the PPSP may choose to send a letter to the HCP with a reminder that pesticide-related illness and injury is a reportable condition. Appendix C contains a sample letter to address this situation.

### 3.8 WORKER REPRESENTATIVES

Unions and legal services may function as referral organizations for persons, especially when the affected persons have concerns about confidentiality and potential retaliation from an employer or landlord. At times, contacts from these organizations may not provide sufficient identifying information for the health agency to conduct an investigation.

### 3.9 HOSPITAL DISCHARGE DATA (HDD)

A set of extensive demographic, clinical, and financial information about every hospital inpatient is received by the hospital association, department of health, health care cost containment organization, insurance commission, or an equivalent organization in most States. This information is taken from the Uniform Bill 92 (UB-92), a document developed for use by third party payers and hospitals. The UB-92 Form (HCFA 1450) can be obtained from the Centers for Medicare and Medicaid Services' Web site <http://cms.hhs.gov/forms/>. Data elements are determined by the National Uniform Billing Committee (NUBC) convened by the American Hospital Association. This committee maintains the UB-92 data specification manual that provides detailed information about coding for the form. More information can be obtained directly from NUBC

at <http://www.nubc.org>. The number of UB-92 data elements collected and used to create the HDD varies from State to State. Access to HDD is usually restricted by legislation. Agreements exist within each State about what elements of HDD are passed to State agencies involved in health policy and public health. The UB-92 includes a unique patient identifier for a person that can be used to track re-admission to the same or different hospitals over time to determine the course and outcome of injury. Unfortunately, there is frequently strict language in a statute or a memorandum of understanding that prohibits release of patient identifiers in the HDD abstract prepared for agencies.

The HDD abstract is usually made available on a quarterly or annual basis, which limits its use for timely case investigation. Health departments may have to pay for access to this data set. However, the HDD can be useful for determining whether the surveillance system is capturing the most severe cases of pesticide poisoning (that is, those requiring inpatient hospital care). Some States receive more timely HDD reports. For example, a revision to the New Jersey code for surveillance of hospitalized occupational and environmental conditions specifically requires reporting of notifiable occupational and environmental diseases and poisonings by hospitals using electronic HDD within 30 days of discharge. The rule also allows the program to request additional information in writing [New Jersey Department of Health 2000]. The same search strategy that is used for emergency logs or workers' compensation data, using ICD9 and ICD10 codes, can be used for HDD.

### 3.10 LABORATORIES

Clinical laboratories may collect specimens and conduct analyses for pesticides and metabolites in a variety of human or animal biologic



media. The most common laboratory tests related to pesticide exposure are measurement of plasma pseudocholinesterase or red blood cell acetylcholinesterase levels, which are tests of cholinesterase inhibition. These tests may be conducted by hospital laboratories, local clinical laboratories, or referral laboratories. Other less frequently conducted tests include detection of pesticides (e.g., organophosphates) or their metabolites in blood or urine. In most cases, these other tests are conducted only by referral laboratories. Reporting rules vary by State about whether reporting is required from the physician ordering the test, the laboratory responsible for sample collection, or the laboratory conducting the test.

There are many complexities to interpretation of cholinesterase inhibition. A review of this topic appears in California's guidelines for monitoring workers exposed to cholinesterase-inhibiting pesticides [California EPA 2002], which are available at the following URL: <http://www.oehha.org/pesticides/programs/Helpdocs1.html>. Among the complexities is the wide normal range. Therefore, someone with a high normal baseline can have substantial cholinesterase inhibition and still have a level within the normal range. In addition, there are several different methods for conducting the tests, and all are subject to variability between and within laboratories. Cholinesterase tests may also be ordered to determine how a patient will respond to certain muscle relaxants used in surgery. This means that a depressed cholinesterase may be totally unrelated to pesticide

exposure. One option, discussed by several States but not yet implemented, is requesting laboratories to indicate on the laboratory request form whether pesticide exposure is the reason for the test. This information would help surveillance programs and laboratories target resources toward pesticide-related laboratory test results.

The establishment of mandatory medical monitoring for workers exposed to cholinesterase-inhibiting pesticides coupled with a requirement for laboratory reporting is another approach that can be used. California and Washington are the only States that have mandatory requirements for such medical monitoring. The California Administrative Code, Title 3, Section 6728, requires medical supervision by a licensed physician for agricultural workers exposed to acute toxicity category 1 or 2 cholinesterase-inhibiting pesticides for 7 or more days in any 30-day period. Included with the code requirements is an extensive set of guidelines for physicians conducting medical supervision of these workers [California EPA 2002]. Washington State adopted a regulation effective in February 2004 that requires cholinesterase testing for some workers [Washington State Department of Labor and Industries 2003]. States considering laboratory reporting and/or requirements for medical monitoring of workers exposed to cholinesterase-inhibiting pesticides should review the findings of the California program [Ames et al. 1989]. An examination of this issue was conducted by an advisory committee in Washington [Washington State Department of Labor and Industries 1995].