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# **Improving Data Quality in Pesticide Illness Surveillance**

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Jim VanDerslice, Ph.D.  
*Office of Environmental Health Assessments*

Lynden Baum, M.S.  
*Office of Environmental Health and Safety*

Judy Bardin, Sc.D.  
*Office of Environmental Health Assessments*

Joanne Prado, M.P.H.  
*Office of Environmental Health Assessments*

Dorothy Tibbetts, M.S.  
*Office of Environmental Health Assessments*

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## **Introduction**

In September 2000 Washington State Department of Health (DOH) was awarded a grant from the National Institutes of Occupational Safety and Health (NIOSH) to enhance the pesticide surveillance system. The specific aim of this project was to increase the value of the information generated by the Pesticide Incident Monitoring Surveillance system (PIMS) for designing interventions by:

- Evaluating and improving the quality of data collected by PIMS;
- Improving the functionality and compatibility of the PIMS database management system; and
- Enhancing the analysis of PIMS data and expanding the dissemination of program and policy relevant information derived from PIMS data.

These efforts were designed to address the surveillance needs identified by NIOSH and expert groups organized by NIOSH (NIOSH, 2000a; NIOSH 2000b) and develop methods and models to help the State of Washington and other states with occupational pesticide illness surveillance to develop the recommended comprehensive activities for state-based surveillance systems (CDC/NIOSH, 1995). This report summarizes the projects and major results of this effort.

## **Overview of Pesticide Illness Surveillance in Washington**

### *Surveillance in Washington State*

Washington State has required investigation of all reported suspected pesticide related illnesses since 1970. Prior to 1990, pesticide illness reporting by health care providers in Washington was on a voluntary basis and the program would receive from 35-180 reported incidents per year. In the late 1980's there was increased concern expressed by farmworker advocates that there was a lack of documentation of pesticide related illness in Washington. At this same time grower groups were pressing for accurate documentation of the extent of alleged worker related illnesses. There was also heightening concern by citizen groups and local communities over agricultural pesticide drift incidents.

In 1989, the legislature, in response to pesticide concerns, made suspected pesticide poisonings a reportable condition and established the Pesticide Incident Reporting and Tracking (PIRT) Review Panel. The purpose of the PIRT Review Panel is to serve as a scientific body to review pesticide related issues, make recommendations to the legislature or appropriate agencies, ensure centralizing data and issue an annual PIRT Review Panel Report to the Legislature. In addition to the Legislature, the PIRT Report is distributed to other state and federal agencies, health care providers, growers, farmworkers and other interested parties.

### *Role of pesticide surveillance in Washington*

The ultimate goal of Washington's surveillance program is prevention. The process of using surveillance data for prevention is depicted in Figure 1. Although more than half of WA's program involves non-occupational and non-agricultural cases, this report focuses on occupational agricultural cases.

Investigation of these occupational cases seeks to identify work practices that lead to overexposure of workers in the agricultural setting. Patterns become evident by investigating cases of suspected pesticide-related illnesses, systematically collecting and recording data from each case, analyzing these data and interpreting the results. Often analyses and observations from several states are used to draw more robust conclusions about practices that are associated with incidents of overexposure and illness. Once such practices have been identified, programs are developed to change these practices through outreach, education and regulation.

The surveillance system in Washington also serves to prevent pesticide illness by individually educating workers on potentially unsafe practices that are discovered in the course of the investigation. This direct intervention can be quite effective as it specifically addresses the issue that may have led to an overexposure.

The surveillance system also has a role in evaluating the effectiveness of public health prevention activities. As programs or policies are put in place to address a specific risk, the surveillance system data can be used to assess whether there has been a decrease in the expected number of illnesses due to that practice.

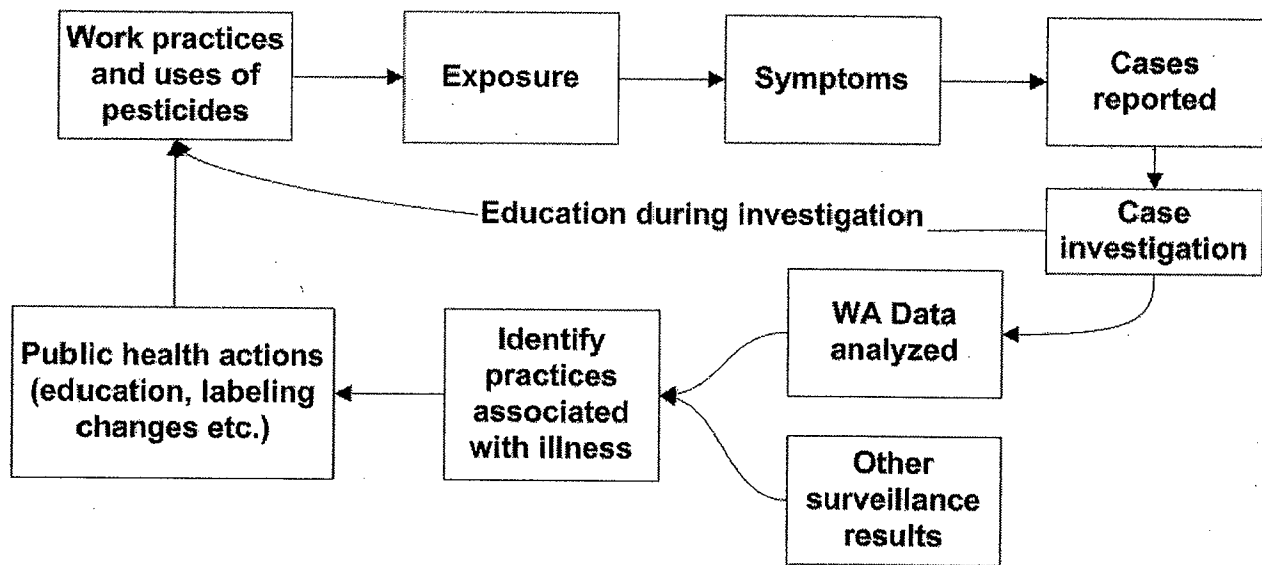


Figure 1: Role of Surveillance in Prevention

### *Description of reporting system*

DOH has the responsibility to investigate reported cases of occupational and non-occupational pesticide illness and exposures. Data regarding suspected cases are gathered by a number of entities. DOH has signed Memoranda of Understanding with the Washington State Department of Agriculture (WSDA), the Washington Poison Center (WPC) and the Department of Labor and Industries (L&I) to receive reports of suspected exposures and illness which are pesticide related. WSDA refers all complaints of pesticide-

related illnesses to DOH. The Claims Administration Program of L&I provides information on all claims filed in which the words “pesticide”, “spray” or “fumigate” are mentioned on a weekly basis. In addition, pesticide poisoning is a reportable condition requiring physicians or other health care practitioners to report all suspected cases. Such reporting may be made directly to DOH or to the WPC. Within 24 hours, the WPC refers all charts regarding patients seen by any health care provider (e.g., hospital, office-based physician, occupational nurse, out patient clinic) who reported being exposed to a pesticide or who had symptoms indicating pesticide poisoning (Figure 2).

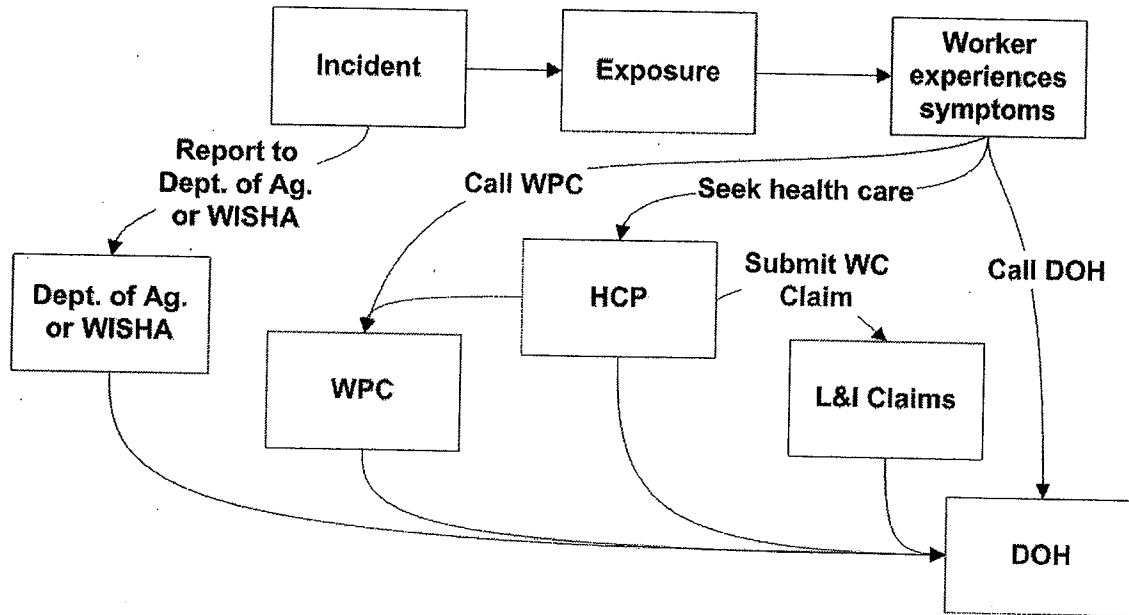


Figure 2: Reporting of Potential Pesticide Illness Cases to DOH

Once an incident is received by the DOH, it is initially reviewed and, if accepted as an incident, the case is then referred to an investigator. Most case investigations require, at a minimum, an interview with the injured party and witnesses, if needed; request for medical records and a request for spray records. Depending upon the circumstances of the case, biological and/or environmental samples are gathered. Following case closure, review and classification, data are entered into the Pesticide Incident Monitoring System (PIMS) database.

The overall goal of this effort was to conduct a comprehensive assessment of PIMS and, based on this assessment, generate recommendations for improving the collection and use of surveillance data to better protect farmers and agricultural workers in the state.

## Sources and quality of case report data

### *Introduction*

The purpose of this effort was to document where case reports were coming from, the degree of overlap of these reports, and the quality of the data coming from each source. The case report data is used for two purposes: (1) to determine whether to open an investigation of that case; and (2) to provide sufficient information to conduct the investigation. The investigator needs to collect information about the exposure and the health effects in order to classify the cases according to the National Public Health Surveillance System Relationship Classifications (PIRT, 2003). Usually this entails interviewing the worker, gathering information from the applicator or grower about pesticide applications that may have lead to the worker being overexposed, and collecting information about clinical effects from the Health Care Provider (HCP).

Timeliness is one of the most important aspects of case report data quality. The longer the interval between the incident and reporting to DOH, the less likely samples of foliage or clothing can be collected to confirm exposure and the more likely that the interviewed worker will lack precision in their memory of the exact location of the incident, the day of symptom onset, or the products involved. For workers employed seasonally, late reporting may prevent DOH from locating the worker. Without information from the worker, it is almost impossible to assess the reasons why the worker was exposed: whether the worker read and followed the pesticide label, whether workplace safety practices were followed, and where the worker was at the time of the incident. On large farms, the exact location and date of the suspected incident is often required to identify the pesticides involved.

The completeness of the case reports is also very important. If a case report does not include valid information on the worker's name, and some means for contacting the worker (e.g., address, phone number), it delays DOH's contact with the worker. Similarly, without accurate information about both the worker and the HCP, it can be impossible to obtain clinic records. While the worker can usually identify their employer when contacted by DOH, having such information as part of the initial case report can assist the investigator when the worker is difficult to contact.

### *Approach*

Since complete information about each of the sources of case reports was not reliably available from the PIMS database, we conducted a manual review of all cases where the exposure occurred while the person was on the job and the job setting was agricultural. There were 167 cases which met these criteria for the year 2000.

We compiled a list of data elements that we considered to be the most important for being able to conduct an investigation (Table 2), and determined which of those data elements had been provided by each case report. Timeliness of the reports was measured as the number of days between the day of exposure and the day the case report was received by DOH. In cases where there was no date of exposure, the date of first onset of symptoms was used.

Each case had already been assigned a Relationship Classification by the DOH Pesticide Surveillance staff. The Relationship Classification characterizes the strength of the relationship between the health effects and the exposure to pesticides. The categories are: definite, probable, possible, unrelated, unlikely, suspicious, asymptomatic, and insufficient information. These classifications were further collapsed into two groups: those for which the relationship with pesticides had been determined (i.e., definite, probable, possible, unrelated, unlikely and asymptomatic), and those where the relationship with pesticides had not been determined (i.e., insufficient information and suspicious). We examined the timeliness and completeness of data provided by each source of case reports, and assessed the relationship between data timeliness and whether the relationship of the case to pesticide exposure had been determined or not.

### *Summary of major findings*

Overall there were 192 case reports for the 167 cases. L&I workers' compensation claims were the most important source of case reports, providing information for almost three-fourths of all pesticide illness cases among agricultural workers (Figure 1). There was some overlap, with about 14% of the cases (n=23) being reported by two sources, and one case being reported by three sources.

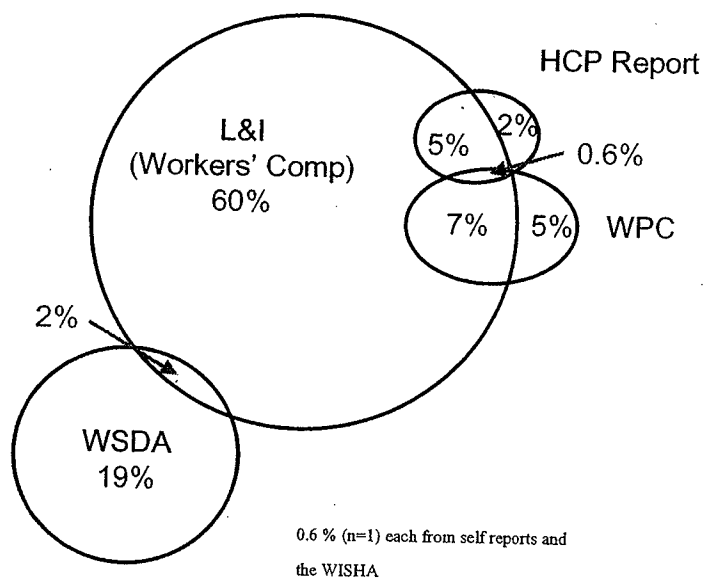


Figure 3. Sources of Reports to PIMS for the Year 2000

The timeliness of the report varied significantly by the source of the report (Table 1). While most of the cases reported by HCPs, WSDA and WPC were reported within five days, only about 2% of those from workers' compensation claims were reported this quickly. The majority of reports from the workers' compensation claims data took over 25 days to be reported to DOH. These delays likely result from a variety of factors including the time it takes the HCP to fill out and submit the Report of Accident (ROA) form, the processing of the ROA form, conducting the text search algorithm to identify potential cases, and transmitting those results to DOH.

**Table 1: Timeliness of Case Reports, by Source of Reporting**

Time from Exposure to Report to DOH (days)	L&I (n=120)	WSDA (n=34)	WPC (n=20)	HCP (n=11)
<5	1.7%	97.1%	80.0%	72.7%
6-15	10.0%	12.9%	15.0%	18.2%
16-25	35.8%	0.0%	0.0%	9.1%
>25	52.5%	0.0%	5.0%	0.0%

The completeness of the different types of information also varied by the source of reporting. Data submitted through the WPC always had the worker's name and very frequently included information about the HCP. This reflects the fact that over 90% of the cases reported by WPC were the result of HCP calls to WPC for information and/or to report the case. As would be expected, reports from WSDA were primarily about incidents and often did not include personal information about any potentially affected workers. However, this information was usually collected at the work site by DOH investigators.

**Table 2: Completeness of Selected Data Elements in Case Reports, by Source of Reporting**

Data Element	L&I (n=120)	WSDA (n=34)	WPC (n=20)	HCP (n=11)
Worker Name	100%	29%	100%	91%
Worker Address	100%	26%	5%	45%
Worker Phone	92%	3%	10%	64%
Worker Age	99%	3%	86%	91%
Provider Name	38%	0%	90%	82%
Clinic Name	86%	0%	95%	91%
MD Address	87%	0%	67%	82%
MD Phone	6%	0%	90%	91%
Work Address	80%	32%	10%	55%
Work Contact	45%	32%	14%	27%
Work Phone	80%	32%	10%	36%

Overall, the relationship between pesticide exposure and illness was determined for 56% of the cases (n=110); the remaining 34% (n=57) were classified as either "suspicious" or "insufficient information." Accordingly, 68% of the 192 case reports were about cases where the relationship between pesticide exposure and illness was determined, while 32% of the case reports were about cases where this relationship was not determined.

The timeliness of the case report was associated with the determination of the case. For case reports received within five days, 13% were classified as "suspicious" or "insufficient information." The proportion of cases that could not be determined increased sharply as the timeliness decreased.

