PUBLIC HEALTH DIVISON
Center for Health Protection, Environmental Public Health
Kate Brown, Governor

Cases of Acute Pesticide Poisoning Reported to the Oregon Health Authority – 2009-2011

Released August 1, 2014

OHA 0197 (10/10)

Cases of Acute Pesticide Poisoning Reported to the Oregon Health Authority – 2009-2011

The Oregon Health Authority's (OHA) Pesticide Exposure Safety & Tracking (PEST) Program seeks to determine the burden of human pesticide-related illness on Oregonians and is uniquely focused on the human-health implications of pesticide incidents reported to PARC. Under Oregon Revised Statute (ORS 413.042, 433.004 & 433.006), healthcare providers who diagnose or suspect human pesticide poisonings are required to report them to their local public health department or OHA within 24 hours. OHA performs a data-driven assessment of human pesticide-related illness in Oregon on which policy can be based. This identification of trends in reported exposures is in keeping with PARC's statutory mandate (ORS 634.550).

Members of PEST's staff classify the available evidence for each pesticide exposure reported which meet the PEST case definition: a reported pesticide exposure resulting in one ocular symptom, one dermal symptom, or two general/systemic symptoms (cough, vomiting, etc.). In addition, PEST actively investigates reported incidents by interviewing affected people and obtaining their medical records when possible when the incident involves a death, a healthcare provider, a PARC referral, is occupationally-related and incidents involving two or more individuals. Staff members then assign one of seven classification categories from a nationally-used case definition from the SENSOR-Pesticides effort at National Institute for Occupational Safety and Health (NIOSH) at the Centers of Disease Control & Prevention (CDC).

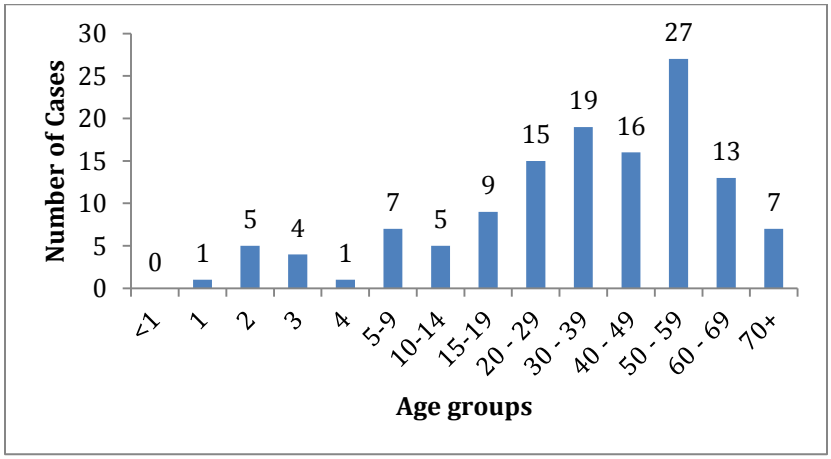
Table 1 summarizes PEST staff assessment of the 256 cases of human pesticide exposures reported in the 2009-2011 biennium (7/1/09 – 6/30/11), including those reported to PARC. Of these, 178 (70%) met the criteria for the case definition's top three categories – "definite," "probable" and "possible." These three categories have the most evidence that the illness being reported was actually pesticide-related. That substantiation may be based on an identified pesticide, a plausible exposure pathway and pesticide poisoning diagnosis by a healthcare provider. These top three categories constitute reported cases of acute pesticide-related illness in Oregon, and the rest of the findings presented in this brief report are on only those 178 cases.

Table 1 – Reports* of human pesticide-related illness 2009-2011 (n=256)

Relationship of symptoms to exposure (n=256)	No. of Cases	Percent
Definite	**9**	**3.5**
Probable	**21**	**8.2**
Possible	**148**	**57.8**
Suspicious	12	4.7
Unlikely	27	10.5
Insufficient Information	32	12.5
Unrelated	7	2.7
Total	256	100

*Available evidence assessed against SENSOR-Pesticides Classification Criteria

Fig. 1 – Age distributionΨ of cases of human acute pesticide-related illnesses reported to OHA 2009-2011 (n=129)



Ψ Ages or dates of birth for 49 (27.5%) of the 178 cases are unknown.

Figure 1 shows that there are more cases of acute pesticide-related illness among adults aged 50- 59 than in other age groups. In the 2009-2011 period, 8% of acute pesticide-related illness occurred in children ages 1-4. This is a change from the 2002-2007 period when 12% of reported acute pesticide-related illness occurred in children ages 1-4. [Please see *Descriptive Analysis of PEST Cases: 2002-2007* which can be found at: http://public.health.oregon.gov/HealthyEnvironments/HealthyNeighborhoods/Pesticides/Documents/Final_Descriptive_Analysis_2002-07.pdf.]

Note: the 2002-2007 study period was three times as long as 2009-2011, so comparison between the two can only be done by percentages.

Table 2 shows reported cases of acute pesticide-related illness by Oregon county. There are an average (mean) of 4.75 exposures per county, while the median (50% above & 50% below) number of exposures per county is one.

There is a large amount of geographic variation in illness rates, so caution should be taken when interpreting them. For example, in 2009-2011 there was just one acute pesticide-related illness in some rural counties (like Wallowa or Harney), but their low population sizes lead to seemingly high and potentially misleading exposure rates.

Table 2 – Reported cases of acute pesticide-related illness, by Oregon county$^{\Psi}$ in 2009-2011 (n=171) that OHA-PEST determined to be the result of acute pesticide exposure.
Mean = 4.75 exposures
Median = 1 exposure

County	2010 population	No. of Cases	Rate per 100k	County	2010 population	No. of Cases	Rate per 100k
Tillamook	25,250	4	15.8	**Malheur**	31,313	1	3.2
Wallowa	7,008	1	14.3	**Clackamas**	375,992	12	3.2
Harney	7,422	1	13.5	**Yamhill**	99,193	3	3.0
Wasco	25,213	3	11.9	**Clatsop**	37,039	1	2.7
Coos	63,043	7	11.1	**Deschutes**	157,733	3	1.9
Crook	20,978	2	9.5	**Umatilla**	75,889	1	1.3
Marion	315,335	29	9.2	**Douglas**	107,667	1	0.9
Klamath	66,380	6	9.0	**Morrow**	11,173	0	0.0
Benton	85,579	7	8.2	**Lincoln**	46,034	0	0.0
Linn	116,672	8	6.9	**Curry**	22,364	0	0.0
Baker	16,134	1	6.2	**Columbia**	49,351	0	0.0
Lane	351,715	18	5.1	**Sherman**	1,765	0	0.0
Hood River	22,346	1	4.5	**Jefferson**	21,720	0	0.0
Jackson	203,206	9	4.4	**Lake**	7,895	0	0.0
Polk	75,403	3	4.0	**Union**	25,748	0	0.0
Multnomah	735,334	29	3.9	**Gilliam**	1,871	0	0.0
Josephine	82,713	3	3.6	**Grant**	7,445	0	0.0
Washington	529,710	17	3.2	**Wheeler**	1,441	0	0.0

$^{\Psi}$ Table does not include seven exposures where the county of occurrence was unknown.

Table 3 – Pesticide releases* (intended pesticide applications, spills, etc.), and cases of acute pesticide-related illness by site category in Oregon in 2009-2011

Site Category	Number of Pesticide Releases by Site	Cases of Acute Pesticide-related Illnesses by Site	Percent of Pesticide Releases by Site	Percent of Acute Pesticide-related Illnesses by Site
Residence	89	122	61.8%	68.5%
Farm	25	12	17.4%	6.7%
Unknown	8	8	5.6%	4.5%
Other	5	9	3.5%	5.1%
Nursery	3	2	2.1%	1.1%
Forest	2	1	1.4%	0.6%
Post-harvest crop processing facility	2	1	1.4%	0.6%
Office/business (non-retail, non-industrial)	2	7	1.4%	3.9%
Road/trail	2	2	1.4%	1.1%
Greenhouse	1	1	0.7%	0.6%
Residential institution	1	6	0.7%	3.4%
School	1	1	0.7%	0.6%
Other institution	1	3	0.7%	1.7%
Retail establishment	1	1	0.7%	0.6%
Private vehicle	0	2	-	1.1%
Service establishment	1	0	0.7%	-
Total	144	178	100.0Ψ	100.0Ψ

Ψ Not equal to 100% because of rounding error.

Table 3 shows the location type where the pesticide was reportedly released, either accidentally in the case of a spill or at the intended site of application.

A single pesticide release can result in acute pesticide-related illnesses in <u>multiple</u> people.

Among cases where the site category is known, a significant proportion of both pesticide releases (61.8%) and exposures (68.5%) occur in residences. These proportions are lower than those reported in the 2002-2007 period where residences were the site of 76% of reported pesticide releases and 75% of reported exposures leading to acute pesticide-related illnesses.

Table 4 - Select categories of cases (exposures) in 2009-2011 where the reported site of pesticide release & location reported by the individual when exposed were identical.

Site of pesticide exposure	Percent where exposure occurred at site of release
Residence	79.5%
Farm	100%
Forest	100%
School	100%
Nursery	100%
Greenhouse	100%
Office/business (non-retail, non-industrial)	85.7%

An on-going public debate in Oregon centers on acute pesticide-related illnesses occurring in individuals who are exposed in one location (home, private vehicle, etc.) by pesticide applications that take place in another nearby location (farm, greenhouse, etc.).

For select site categories, Table 4 shows proportions where location of the pesticide release (intended pesticide applications, spills, etc.) and the site of exposure are identical (e.g. exposed/sickened at home to insecticide spill at home). While the sites of pesticide release and the exposure were identical for all cases of acute pesticide-related illness occurring on farms, forest, schools, plant nurseries, and greenhouses, this is not true for exposures occurring in residences and offices.

There were 26 exposures reported as occurring in residences where the event did not also occur in the same residence. Of these, 23 were due to drift of a pesticide application at a nearby farm; one resulted from drift from an application at an adjacent nursery, one resulted from drift from an application done at a post-harvest crop processing facility, and one resulted from drift from an application by helicopter to a nearby forest.

Table 5 - Non-occupational acute pesticide-related illnesses accompanying exposure 2009-2011

Reported activity when exposed	No. of Cases	Percent
Routine outdoor living (not involving pesticide use)	48	32.2%
Routine indoor living (not involving pesticide use)	46	30.9%
Applying pesticide	41	27.5%
Applying pesticide to self or another human (usually DEET)	6	4.0%
Mixing/loading pesticide	1	0.7%
Transport/disposal of pesticide	1	0.7%
Not applicable	3	2.0%
Unknown	3	2.0%
Total	149	100

Table 6 - Acute pesticide-related illnesses by work-(n=149) by activity related (occupational) activity 2009-2011 (n=29) reported as resulting from pesticide exposure

Reported activity at work	No. of Cases	Percent
Routine on-the-job activity (not involving pesticide use)	18	62.1%
Applying pesticides	6	20.7%
Mixing/loading pesticides	2	6.9%
Unknown	2	6.9%
Not applicable	1	3.4%
Total	29	100.0%

Tables 5 and 6 indicate the activities that individuals were reportedly engaged in when a pesticide exposure occurred.

Almost 2/3 of non-occupational acute pesticide-related illnesses (Table 5) occurred to individuals who were engaged in routine outdoor or indoor activities, usually at or in their own homes, and were not applying pesticides themselves. Frequent scenarios include instances where: flea/tick repellent was applied to the family dog, which was then immediately hugged by a child (thus exposing the child); a family member spraying an insecticide for ants (and another family member unwittingly brushed up against the wet surface); or an application that drifted into the home from a nearby farm. In over ¼ of the non-occupational cases, individuals were exposed while applying pesticides around a residence, usually their own.

In sum, most exposures occurred when people came in contact with pesticides in the course of routine activities, not through the application of pesticides themselves.

For work-related (occupational) exposures (Table 6), almost 2/3 of individuals were engaged in routine on-the-job activities not related to pesticides while 1/5 reported exposure while applying pesticides.

Table 7 - Sign & symptoms* associated with acute pesticide-related illnesses in 2009–2011 (n = 392)

Sign & symptom categories	Number
Respiratory: health effects involving the lungs or upper respiratory system	107
Neurological: health effects involving the nervous or sensory systems	71
Gastrointestinal: health effects involving the gastrointestinal tract)	69
Dermatological: health effects involving irritation or sensitization of skin.	64
Ocular: health effects involving the eye	63
General: health effects not captured by other health effects categories	10
Cardiovascular: health effects involving the heart or circulatory system	8
Total	392

* Total number of signs and symptoms reported is greater than the total number of cases because a case may report more than one sign or symptom.

Table 8 - Identified functional classes of pesticide products reportedly associated with acute pesticide-related illnesses in 2009–2011 (n=156)

Functional classes of product	Number	Percent of functional classes of product
Insecticides	85	54.5%
Herbicide\Algaecide	42	26.9%
Disinfectant	6	3.8%
Fungicide	5	3.2%
Fumigant	5	3.2%
Insect Repellent	5	3.2%
Insecticide and Fungicide (01 & 04)	3	1.9%
Insecticide and Other (01 & 96)	3	1.9%
Rodenticide	1	0.6%
Antifouling agent (marine paints)	1	0.6%
Total	156	100.0%

In the 2009-2011 study period, 392 individual health signs or symptoms were reported to be associated with the 178 cases of illness that were later determined by OHA staff to be actually pesticide-related (Table 7). Signs and symptoms are either self-reported by the exposed individual, by a health care provider, or both. Medical signs, by definition, are only reported by a health care provider.

The most commonly reported categories of signs and symptoms were respiratory (27%), including cough and shortness of breath; neurological (18%), like headache and dizziness; and gastrointestinal (18%) signs and symptoms, like nausea and vomiting.

Table 8 displays the identified functional classes of pesticide products involved with the pesticide releases (n=144) associated with acute pesticide-related illnesses reported in 2009–2011 (n=178). The "functional class" describes the use or purpose for which the pesticide product is registered with the EPA's Office of Pesticide Programs.

A product can be registered for more than one use. Because reports of acute pesticide-related illnesses often describe only the active ingredient that is purportedly causing the symptoms, PEST staff may not have access to information such as a product's EPA registration number that would more accurately identify the formulation in question.

For 2009-2011, the top three identified pesticides classes known to be involved in cases were the same as those in the 2002-2007 study period: insecticides, herbicide\algaecides and disinfectants.

Specific factors, determined by the PARC Board to have contributed to the cases of acute pesticide-related illness reported to PARC (a portion of the cases in this analysis), are discussed in its 2009-2011 Biennial Legislative Report. [This Report can be found in the PARC annual reports section of the PARC website.] In general, most of the exposures detailed here likely could have been prevented if the user had read and complied with the use and storage instructions on the product label. These are required to be affixed on every pesticide product sold in the United States.

Readers who are interested in comparing Oregon's pesticide-related illnesses to those of other states that also use CDC's SENSOR-Pesticides case classification system may view studies published in peer-reviewed journals at the SENSOR-Pesticides website:
http://www.cdc.gov/niosh/topics/pesticides/journal.html.