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SUBJECT: OVERVIEW OF ANTIMICROBIAL ILLNESSES EVALUATED BY THE PESTICIDE ILLNESS SURVEILLANCE PROGRAM, 2008-2010

I ran a query of the California Pesticide Illness Surveillance Program (PISP) Oracle database using Standard Query Language and extracted case episodes received by PISP from 2008- 2010 in which exposure to pesticide occurred where the active ingredient functional class code is entered as antimicrobial.

Antimicrobial products are unique to DPR because some are labeled for both pesticide and non-pesticide uses. For example, household bleach may be used to whiten a stain (not a pesticide use), or it may be used to disinfect surfaces such as toilets (a pesticide use). PISP illness investigations that involve these dual-use products require reasonable evidence of pesticide use to classify the case as associated with pesticide exposure.

This basic analysis provides an overview of antimicrobial illnesses. After an overview of both associated and non-associated cases, data tables provide insight into the antimicrobial cases evaluated as associated with pesticide exposure. Key points are in bold font and italicized.

It is important to note that PISP receives hundreds of reports of antimicrobial exposures that do not meet the defined criteria for assigning a case for investigation. The criteria are: a) a pesticide was involved; b) the individual experienced symptoms; and c) medical attention was sought. In 2011, PISP began collecting information about these non-cases to illustrate exposures brought to our attention while maintaining the sensitivity of our illness data.

Background

PISP receives reports of pesticide illness from Doctor's First Report of Occupational Illness and Injury, documents associated with California workers' compensation claims, as well as illness reported by California Poison Control System (CPCS). Some cases are also reported directly from medical professionals. Under California law, physicians are required to report any suspected case of pesticide-related illness or injury by telephone to the local health officer within 24 hours of examining the patient.

PISP scientists evaluate these initial reports and assign cases that meet program criteria for investigation to the County Agricultural Commissioner (CAC). CACs investigate identified pesticide illnesses that occur in their jurisdictions. They attempt to locate and interview all people with knowledge of the exposure events, collect samples when useful, and review relevant records. When investigations are complete, CACs send reports to PISP describing their findings. PISP scientists evaluate medical reports and all information the CACs gather in the investigative process. They abstract and encode basic descriptors of the event, then undertake a complex synthesis of all available evidence to assess the likelihood that pesticide exposure caused the illness. Standards for the determination are described in the PISP program brochure, "Preventing Pesticide Illness," which can be viewed or downloaded from DPR's web site at http://www.cdpr.ca.gov/docs/whs/pisp /brochure.pdf .

Summary

Antimicrobial pesticides include sanitizers, disinfectants, algaecides and slimicides and products such as household and commercial chlorine products, pine oil, quaternary ammonia, medical sterilants, and chemicals used to treat drinking and wastewater as well as pools and spas. From 2008-2010, antimicrobial illnesses accounted for almost 40% of all associated illness cases.

Year	Associated[a] antimicrobial cases	Associated cases not antimicrobial	Non-associated cases	Total associated cases	Total cases	% of associated cases attributed to antimicrobials
2008	320	574	381	894	1275	36%
2009	399	519	411	918	1329	43%
2010	297	515	302	812	1114	37%
2008-2010	1016			2624		39%

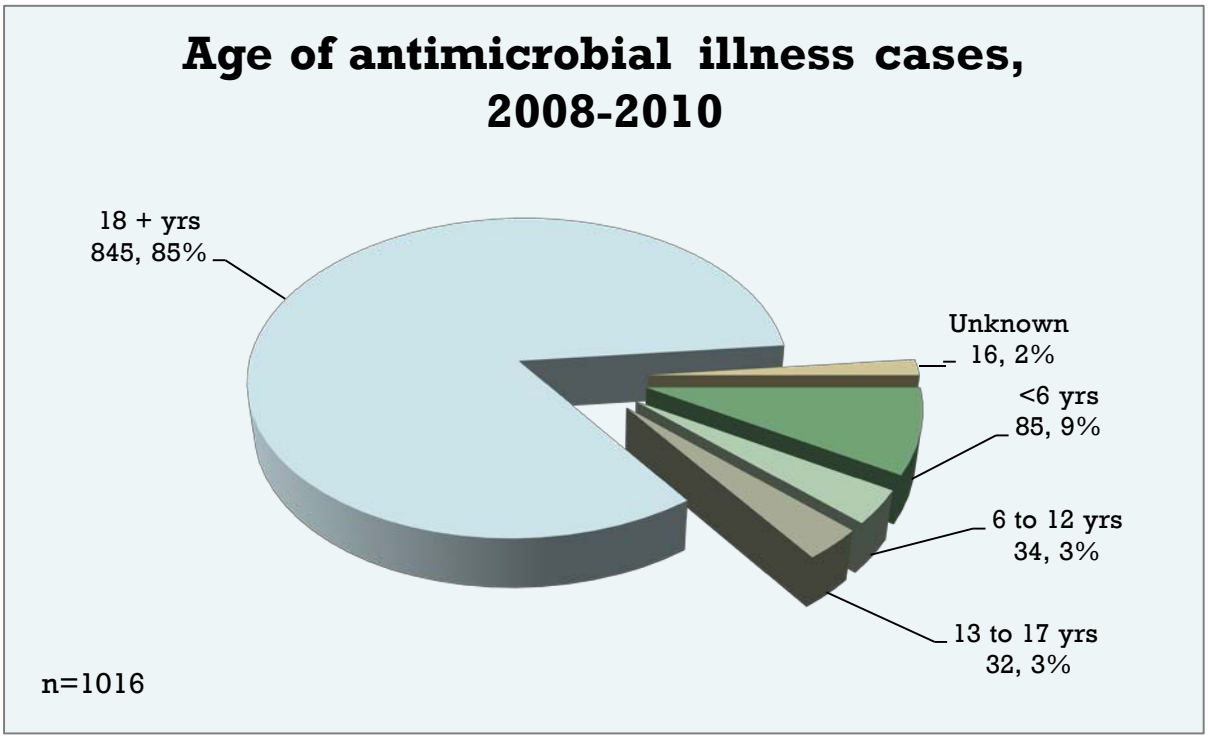
A case is the Pesticide Illness Surveillance Program representation of a person whose health problems may relate to pesticide exposure.

[a] Associated cases are those evaluated as definitely, probably, or possibly related to pesticide exposure. A definite relationship indicates a high degree of correlation between the pattern of exposure and resulting symptomatology. The relationship requires both physical evidence of exposure and medical evidence of consequent ill health to support the conclusions. A probable relationship indicates a relatively high degree of correlation between the pattern of exposure and resulting symptomatology. Either medical or physical evidence is inconclusive or unavailable. A possible relationship indicates that health effects correspond generally to the reported exposure, but evidence is not available to support a relationship.

Of the 1,016 associated antimicrobial cases under review, the following active ingredients were most commonly implicated. Please note that more than one ingredient may be involved in one case.

	Associated antimicrobial cases	Sodium Hypochlorite	Quaternary Ammonia	Hydrogen Chloride	Cyanuric Acid	Calcium Hypochlorite	Glutaraldehyde	Pine Oil
2008	320	144	83	33	20	10	7	10
2009	399	181	108	17	16	20	15	8
2010	297	148	77	17	24	10	6	1
2008-2010	1016							

Sodium hypochlorite was implicated in exposure in 47% of all associated antimicrobial cases, followed by quaternary ammonia, which was a factor in 26% of antimicrobial cases.



Adults constituted 85% of associated antimicrobial cases. Children under 6 were the most represented of the 3 youth age groups, accounting for 9% of all associated antimicrobial illnesses.

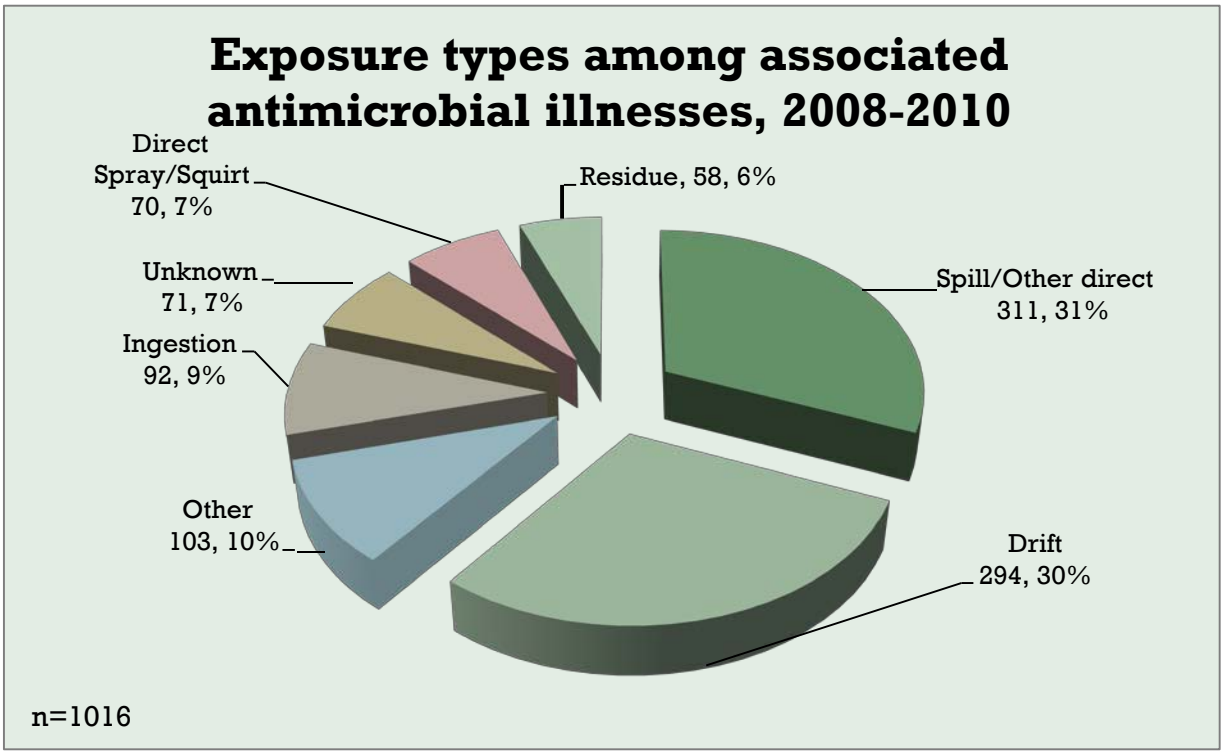
The majority of associated antimicrobial illnesses are considered occupational, defined by PISP as occurring while an individual was at work. ***Occupational exposures account for 67% of the 1,016 cases.*** The cases were largely non-agricultural as well, with only 64 (6%) stemming from a pesticide intended to contribute to an agricultural commodity.

Of the 1,016 associated antimicrobial illness cases, ***138 persons (13.6%) missed at least one day of work, school, or normal activity.*** Fourteen of these cases missed some work, but the exact number of days is unknown. Days from work, when known, ranged from 1 to 42, with a median of 2 and an average of 3.4 days. Disability days remained unknown for 212 cases, and no days were missed in 666 of the 1,016 cases.

Hospitalization occurred as a result of antimicrobial exposure in 16 cases. One case was hospitalized, but the number of days was not determined. Days hospitalized ranged from 1 to 5, with a median of 2 and an average of 2.3 days. Whether hospitalization occurred was unknown in 14 cases, and 986 cases were not hospitalized.

PISP categorizes symptoms by body system: skin, eye, respiratory, or systemic. Of the 1,016 cases, 278 had symptoms affecting more than one category. The eye was affected in 454 cases, the skin in 183, the respiratory symptoms were reported by 432 cases, and 339 cases had systemic symptoms such as headache, vomiting, or nausea.

PISP defines exposure as the characterization of how an individual came in contact with a pesticide. Exposures include drift, residue, direct spray/squirt, spill/other direct, ingestion, other, multiple, and unknown. Drift is defined as spray, mist, fumes, or odor carried from the target site by air. Residue is the part of a pesticide that remains in the environment for a period of time following an application or drift. Direct spray/squirt is material propelled by application or mix/load equipment. Spill/other direct refers to contact made during an application where the material is not propelled by the equipment, expected direct contact during use, and leaks or spills unrelated to an application. Ingestion may be intentional or unintentional. The exposure code ‘other’ is another known route not included above, as smoke from a fire or residue from a spill.



Spill/other direct and drift exposures together account for the majority (61%) of cases. A common scenario involving spill/other direct are bleach or sanitizer exposures to the eye. An example of a common drift exposure is the mixing of bleach and acids in household or occupational cleaning.

Incident setting is defined as the location where the incident occurred. Application site is the site of the pesticide application or intended site of application. These tables list only the most common incident setting and application sites among associated antimicrobial illnesses.

Most common incident settings among associated antimicrobial illnesses						
	Associated antimicrobial cases	Residential (home, multi-unit, other residence)	service & retail establishments	crop/ livestock/ animal premise	Medical/ hospital	School
2008	320	88	58	58	36	19
2009	399	91	70	53	53	27
2010	297	103	50	34	31	14
2008-2010	1016	282	178	145	120	60

Most common application sites among associated antimicrobial illnesses								
	Associated antimicrobial cases	Bathrooms & toilets	Surfaces & inanimate objects	Water - Pool & spa	Water - drinking, waste, & industrial processing	Eating establishments	Hospital instruments, machines, implements, etc	Food Processing/ Handling Plant/Area
2008	320	64	32	44	14	29	22	14
2009	399	79	47	39	28	43	36	18
2010	297	47	41	43	26	20	20	16
2008-2010	1016	190	120	126	68	92	78	48

Sodium Hypochlorite

Among the 473 associated antimicrobial cases involving sodium hypochlorite, investigation found that 372 implicated only sodium hypochlorite with exposure. The remaining 101 cases involved at least two active ingredients.

Occupational cases comprise 62.3% (296) of associated sodium hypochlorite cases. The most common mode of exposure was drift (31%), followed by spill/other direct (24%).

About 80% of sodium hypochlorite cases affected persons over the age of 18. Much like the overall antimicrobial cases, children under age six were the most represented of all children, accounting for 10% of all associated sodium hypochlorite cases.

Questions or comments may be directed to PISP scientist April Holland, MPH. Please send email to aholland@cdpr.ca.gov, or call 916-445-3488.