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**Survey of California Physicians:
Diagnosing Pesticide Related Illnesses**

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Survey of California Physicians
Diagnosing Pesticide Related Illness (Draft)

INTRODUCTION

Under California law, all pesticide-related poisonings (whether confirmed or suspected) must be reported by physicians to the local county health officer within 24 hours by telephone, and a 'Doctor's first report of Occupational Injury or Illness' must be filed within seven days. The County health officer must then report each incident to the county agricultural commissioner and to the California Department of Food and Agriculture, the Department of Health Services, and the Director of Industrial Relations.

The purpose of the survey was to assess the knowledge of the pesticide illness reporting requirements from California physicians in those counties most likely to have agricultural pesticide poisonings. The survey included practicing physicians in clinical specialties assumed most likely to treat pesticide emergencies: internal medicine, emergency medicine, and family practice. The study included practices in six rural counties of California, Tulare, Fresno, San Joaquin, Kern, Imperial and Monterey, and one urban control county, Alameda.

METHODS

A short questionnaire was developed to obtain information about the extent of pesticide poisonings in physicians' usual practice. The survey requested demographic information for each physician: year of graduation from medical school, type of practice, and number of patients seen per week. The physicians were asked what training they had received in diagnosis and treatment of pesticide poisonings, and what additional training they wanted. A pretest of the questionnaire was carried out among 50 UC Davis Medical Center clinicians.

We purchased a mailing list from the California Medical Association, (CMA) which maintains a list of all practicing physicians, both CMA members and non-members. Of 1375 physicians who were mailed the first questionnaire, 83 had moved out of the target counties, and 185 had retired from active practice and were therefore removed from the study population. There were 1107 practicing physicians within the target counties who were sent the questionnaire; 50% (555/1107) returned completed questionnaires. Blank, unanswered questionnaires were returned by 4%, 42/1107, and 46% (510/1107) did not respond. Table 1 shows a breakdown by county of the sample population.

The null hypothesis of the survey was that there would be no difference in knowledge regarding reporting requirements between urban physicians and the rural physicians. The alternative hypothesis was that there would be a difference in reporting patterns, and that suspected poisonings would be less likely to be reported by urban practitioners

DEMOGRAPHIC DATA

Table 2 shows the distribution of the year of graduation from medical school information. The most frequent decade of graduation for both the rural (34%, 146/428) and urban (42%, 35/83) physicians was 1970 - 1979. Approximately one-fourth of both rural (27%; 117/428) and urban (22%, 18/83) areas had physicians who had graduated from medical school prior to 1959. Table 3 shows the different types of practices that the physicians represented. The two greatest differences between the rural and urban populations was in the percentage of physicians who were in private practice, (Rural= 51%, 221/436; Urban= 28%, 21/75), and those physicians who practice within HMO's (Rural=3%,13/436, Urban=28%,21/75).

Of those physicians who indicated that they were board certified, several differences between the rural and urban physicians are illustrated. A larger percentage of rural physicians are certified in family practice (Rural=55%, 159/289; Urban=20%, 13/66). However, a larger percentage of the urban physicians are certified in internal medicine, (Urban=49%, 32/66; Rural=28%, 82/289) and in emergency medicine (Rural=12%, 34/289; Urban=30%, 20/66). (Table 4)

PATIENT LOAD

The distribution of number of acute patients seen per week was very similar in the rural and urban areas. (Table 5) The differences are in the number of physicians who see either very few or very many acute patients. There are more rural physicians who see 4 or fewer acute patients a week (22%, 80/360; Urban=12%, 7/73), and there are more urban physicians who see 50 or more acute patients per week (Urban=34%, 25/73; Rural=21%, 75/360). This distribution is reversed when looking at the number of outpatients seen. There are more rural physicians who see 100 or more outpatients per week (Rural=45%, 187/419; Urban=26%. 19/71); and there are more urban physicians who see fewer than 50 outpatients per week (Urban=37%,26/71; Rural=20%, 83/187).

REPORTED PESTICIDE POISONINGS

As expected, the rural physicians saw more cases of suspected or confirmed pesticide poisoning per year (Rural=20%, 93/471; Urban=12%, 10/87), and 7% (35/471) of the reporting rural physicians saw 5 or more cases of pesticide poisoning per year. A higher percentage of urban physicians reported having seen no cases at all, (Urban 89%, 77/87; Rural 73%, 343/471). (Table 6)

In the rural areas, most poisoning cases were seen in practices that were located in academic settings or in hospitals. In urban areas the group practices and hospital practices were most likely to see poisoning cases. (data not shown)

The specialty most likely to see pesticide poisoning in the rural counties was family practice (42%, 24/57), and in the urban areas emergency medicine had 50% (4/8) of the pesticide cases.

KNOWLEDGE OF REPORTING REQUIREMENTS

Preliminary analysis of the results indicate that 27% (128/471) of the responding rural physicians, and 12% (10/87) of the urban physicians, saw one or more cases of suspected or confirmed pesticide poisoning during 1987. (Table 6) Knowledge of pesticide poisoning reporting requirements is not uniform; 24% (113/463) of the rural physicians, and 56% (48/86) of the urban physicians who responded to the survey did not know the legal reporting requirements. (Table 7)

The physicians were asked to indicate to which of the following agencies they were required to report a case of suspected or confirmed pesticide poisoning: county health officer, pesticide manufacturer, California Department of Food and Agriculture (CDFA), or California Department of Health Services (CDHS). They were to indicate yes, no, or not sure next to each choice. For purposes of analysis, a 'not sure' answer was treated as a 'no'. The results are shown in Table 7. The rural physicians were more likely to know that reporting was required to the county health officer (Rural yes=76%, 350/463; Urban yes= 44%, 38/86). More than half of the urban physicians (56%, 48/86) did not know that reporting was required. A small percentage of both rural and urban physicians mistakenly thought that reporting directly to CDFA was required, (Urban=9%, 8/85; Rural=11%, 48/452). There were a large number of physicians in both the rural and urban areas that

mistakenly thought that reporting directly to the CDHS was required, (Urban=37%, 32/86; Rural=31%, 142/455).

The number of pesticide cases seen per year was related to the knowledge of reporting requirements. (Table 8) The more poisoning cases that the physician saw, the more likely it was that they knew to report. Within the rural counties, 76% (251/331) of the physicians who saw no poisoning cases knew to report, but the percentage who knew to report increases to 89% (31/35) for those who saw 5 or more poisoning cases. In the urban county, 43% (32/74) of the physicians who had seen no poisoning cases knew to report, and the percentage increases to 60% (6/10) for those who had seen 1 to 4 cases per year. An important observation is the fact that across the board, regardless of the number of pesticide poisonings seen per year, 24% (113/463) of the rural physicians, and 56% (48/86) of the urban physicians did not know that a report was required by law to the local county health officer when they had diagnosed a case of pesticide poisoning.

When the type of practice was compared to knowledge of reporting within the group of urban physicians, the emergency medicine specialty, (60%, 12/20), showed a much higher percentage of correct responses than either family practice (33%, 4/12), or internal medicine (39%, 12/31). Within the rural physicians, there was a high percentage of correct responses in all three of the specialties, 65%-85% range. (Table 9)

NEED FOR POST-GRADUATE COURSES

The physicians uniformly indicated a strong desire for additional training in all three topics: diagnosis and treatment of pesticide illnesses (Rural yes=86%, 255/297; Urban yes=78%, 46/59); evaluation of toxicologic test results (Rural yes=82%, 264/321; Urban yes=67%, 45/67); and chronic effects of pesticide poisoning (Rural yes=81%, 278/343; Urban yes=72%, 48/67). (Table 10)

CONCLUSION

Most pesticide illnesses are diagnosed at either academic settings or in community hospitals regardless of whether practice is urban or rural. Most pesticide poisonings are seen by family practitioners in rural settings, and by emergency room physicians in the urban area. Knowledge of reporting is directly related to the number of patients seen by the physician with a greater percentage knowing to report when

greater than 1 to 4 patients with pesticide illnesses are diagnosed. Despite the presence of a pesticide poisoning reporting law in California, it is discouraging to note that 24% of the rural physicians and 56% of the urban physicians are unaware of the requirements of this important public health regulation. There appears to be a large unmet need for training of physicians and clinical personnel in diagnosing, interpreting toxicology test results, and understanding chronic conditions associated with pesticide illnesses.

Table 1

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TABLE OF STATUS BY CO

STATUS	CO								
FREQUENCY									
PERCENT									
ROW PCT									
COL PCT	KERN	TULARE	FRESNO	MONTEREY	SAN JOAQUIN	IMPERIAL	ALAMEDA		TOTAL
BLANK	6	5	12	5	6	1	7		42
	0.44	0.36	0.87	0.36	0.44	0.07	0.51		3.05
	14.29	11.90	28.57	11.90	14.29	2.38	16.67		
	2.79	3.42	3.24	2.66	2.52	5.56	3.50		
COMPL	83	66	159	57	94	8	88		555
	6.04	4.80	11.56	4.15	6.84	0.58	6.40		40.36
	14.95	11.89	28.65	10.27	16.94	1.44	15.86		
	38.60	45.21	42.97	30.32	39.50	44.44	44.00		
MOVED	11	4	30	16	15	1	6		83
	0.80	0.29	2.18	1.16	1.09	0.07	0.44		6.04
	13.25	4.82	36.14	19.28	18.07	1.20	7.23		
	5.12	2.74	8.11	8.51	6.30	5.56	3.00		
NONRE	86	48	125	77	96	5	73		510
	6.25	3.49	9.09	5.60	6.98	0.36	5.31		37.09
	16.86	9.41	24.51	15.10	18.82	0.98	14.31		
	40.00	32.88	33.78	40.96	40.34	27.78	36.50		
RETIR	29	23	44	33	27	3	26		185
	2.11	1.67	3.20	2.40	1.96	0.22	1.89		13.45
	15.68	12.43	23.78	17.84	14.59	1.62	14.05		
	13.49	15.75	11.89	17.55	11.34	16.67	13.00		
TOTAL	215	146	370	188	238	18	200		1375
	15.64	10.62	26.91	13.67	17.31	1.31	14.55		100.00

Table 2

SAS

TABLE OF Q1 BY Q2

Q1 (ID #)	Q2 (YEAR OF MD GRAD)						TOTAL
FREQUENCY	1935-1959	1960-1969	1970-1979	1980-1985	1986		
PERCENT							
ROW PCT							
COL PCT							
RURAL	48	117	55	146	109	1	428
		22.90	10.76	28.57	21.33	0.20	83.76
		27.34	12.85	34.11	25.47	0.23	
		86.67	80.88	80.66	86.51	100.00	
URBAN	6	18	13	35	17	0	83
		3.52	2.54	6.85	3.33	0.00	16.24
		21.69	15.66	42.17	20.48	0.00	
		13.33	19.12	19.34	13.49	0.00	
TOTAL		135	68	181	126	1	511
		26.42	13.31	35.42	24.66	0.20	100.00

FREQUENCY MISSING = 54

Table 3

TABLE OF Q1 BY Q3

Q1 (ID #)	Q3 (PRIMARY PRACTICE)						TOTAL
FREQUENCY	PRIVATE PRAC	GROUP PRAC	HOSPITAL	HMO	ACADEMIC		
PERCENT							
ROW PCT							
COL PCT							
RURAL	40	221	128	59	13	15	436
		43.25	25.05	11.55	2.54	2.94	85.32
		50.69	29.36	13.53	2.98	3.44	
		91.32	86.49	83.10	38.24	93.75	
URBAN	14	21	20	12	21	1	79
		4.11	3.91	2.35	4.11	0.20	14.68
		28.00	26.67	16.00	28.00	1.33	
		8.68	13.51	14.90	61.76	6.25	
TOTAL		242	148	71	34	16	511
		47.36	28.96	13.89	6.65	3.13	100.00

FREQUENCY MISSING = 54

Table 4

TABLE OF Q1 BY Q6

Q1 (ID #)	Q6 (BOARD CERTIFIED)					
FREQUENCY		FAMILY PRACTICE	INTERNAL MED	EMERGENCY MED	OTHER	TOTAL
PERCENT						
ROW PCT						
COL PCT						
RURAL	187	159	82	34	14	289
		44.79	23.10	9.58	3.94	81.41
		55.02	28.37	11.76	4.84	
		92.44	71.93	62.96	93.33	
URBAN	23	13	32	20	1	66
		3.66	9.01	5.63	0.28	18.59
		19.70	48.48	30.30	1.52	
		7.56	28.07	37.04	6.67	
TOTAL		172	114	54	15	355
		48.45	32.11	15.21	4.23	100.00

FREQUENCY MISSING = 210

Table 5

TABLE OF Q1 BY Q8

Q1 (ID #)	Q8 (# ACUTE PATIENTS)					
FREQUENCY	NONE	1 TO 4 CASES	5 TO 15 CASES	16 TO 49 CASES	50 TO 371+ CASES	TOTAL
PERCENT						
ROW PCT						
COL PCT						
RURAL	116	37	80	102	66	360
		8.55	18.48	23.56	15.24	83.14
		10.28	22.22	28.33	18.33	
		84.09	89.89	85.00	82.50	
URBAN	16	7	9	18	14	73
		1.62	2.08	4.16	3.23	16.86
		9.59	12.33	24.66	19.18	
		15.91	10.11	15.00	17.50	
TOTAL		44	89	120	80	433
		10.16	20.55	27.71	18.48	100.00

FREQUENCY MISSING = 132

Table 6

TABLE OF Q1 BY Q10

Q1 (ID #)	Q10 (# PESTICIDE CASES/YR)				
FREQUENCY	NONE	1 TO 4 CASES	5 OR MORE CASES	TOTAL	
PERCENT					
ROW PCT					
COL PCT					
RURAL	5	343	93	35	471
		61.47	16.67	6.27	84.41
		72.82	19.75	7.43	
		81.67	90.29	100.00	
URBAN	2	77	10	0	87
		13.80	1.79	0.00	15.59
		88.51	11.49	0.00	
		18.33	9.71	0.00	
TOTAL		420	103	35	558
		75.27	18.46	6.27	100.00

FREQUENCY MISSING = 7

Table 7

SAS

TABLE OF Q1 BY Q11

Q1 (ID #)	Q11 (REPORT TO COUNTY)				
FREQUENCY	YES	NO	NOT SURE	TOTAL	
PERCENT					
ROW PCT					
COL PCT					
RURAL	13	350	6	107	463
		63.75	1.09	19.49	84.34
		75.59	1.30	23.11	
		90.21	66.67	70.39	
URBAN	3	38	3	45	86
		6.92	0.55	8.20	15.66
		44.19	3.49	52.33	
		9.79	33.33	29.61	
TOTAL		388	9	152	549
		70.67	1.64	27.69	100.00

FREQUENCY MISSING = 16

SAS

Table 8A

TABLE 1 OF G11 BY G10
CONTROLLING FOR G1=RURAL

G11(REPORT TO COUNTY)		G10(# PESTICIDE CASES/YR)			
FREQUENCY	PERCENT	NONE	1 TO 4 CASES	5 OR MORE CASES	TOTAL
ROW PCT	COL PCT				
	0	12	1	0	
YES	4	291	64	31	346
		54.80	13.97	6.77	75.55
		72.54	18.50	8.96	
		75.83	69.57	88.57	
NO	0	2	3	1	6
		0.44	0.66	0.22	1.31
		33.33	50.00	16.67	
		0.60	3.26	2.86	
NOT SURE	1	78	25	3	106
		17.03	5.46	0.66	23.14
		73.58	23.58	2.83	
		23.56	27.17	8.57	
TOTAL		331	92	35	458
		72.27	20.09	7.64	100.00

FREQUENCY MISSING = 18

SAS

Table 8B

TABLE 2 OF G11 BY G10
CONTROLLING FOR G1=URBAN

G11(REPORT TO COUNTY)		G10(# PESTICIDE CASES/YR)			
FREQUENCY	PERCENT	NONE	1 TO 4 CASES	5 OR MORE CASES	TOTAL
ROW PCT	COL PCT				
	0	3	0	0	
YES	0	32	6	0	38
		38.10	7.14	0.00	45.24
		84.21	15.79	0.00	
		43.24	60.00		
NO	0	3	0	0	3
		3.57	0.00	0.00	3.57
		100.00	0.00	0.00	
		4.05	0.00		
NOT SURE	2	39	4	0	43
		46.43	4.76	0.00	51.19
		90.70	9.30	0.00	
		52.70	40.00		
TOTAL		74	10	0	84
		88.10	11.90	0.00	100.00

FREQUENCY MISSING = 5

Table 9A

SAS

TABLE 2 OF G6 BY G11
CONTROLLING FOR G1=URBAN

G6(BOARD CERTIFIED)	G11(REPORT TO COUNTY)				TOTAL
	YES	NO	NOT SURE		
FREQUENCY	1	9	1	12	
PERCENT					
ROW PCT					
COL PCT					
<hr/>					
FAMILY PRACTICE	4	0	8	12	18.75
	6.25	0.00	12.50		
	33.33	0.00	66.67		
	13.79	0.00	24.24		
<hr/>					
INTERNAL MED	12	1	18	31	48.44
	18.75	1.56	28.13		
	38.71	3.23	58.06		
	41.38	50.00	54.55		
<hr/>					
EMERGENCY MED	12	1	7	20	31.25
	18.75	1.56	10.94		
	60.00	5.00	35.00		
	41.38	50.00	21.21		
<hr/>					
OTHER	1	0	0	1	1.56
	1.56	0.00	0.00		
	100.00	0.00	0.00		
	3.45	0.00	0.00		
<hr/>					
TOTAL	29	2	33	64	100.00
	45.31	3.13	51.56		

FREQUENCY MISSING = 25

Table 9B

SAS

TABLE 1 OF G6 BY G11
CONTROLLING FOR G1=RURAL

G6(BOARD CERTIFIED)	G11(REPORT TO COUNTY)				TOTAL
	YES	NO	NOT SURE		
FREQUENCY	6	143	2	36	
PERCENT					
ROW PCT					
COL PCT					
<hr/>					
FAMILY PRACTICE	4	113	3	39	155
	40.07	1.06	13.83		54.96
	72.90	1.94	25.16		
	54.59	75.00	54.93		
<hr/>					
INTERNAL MED	2	52	0	28	80
	18.44	0.00	9.93		28.37
	65.00	0.00	35.00		
	25.12	0.00	39.44		
<hr/>					
EMERGENCY MED	0	29	1	4	34
	10.28	0.35	1.42		12.06
	85.29	2.94	11.76		
	14.01	25.00	5.63		
<hr/>					
OTHER	1	13	0	0	13
	4.61	0.00	0.00		4.61
	100.00	0.00	0.00		
	6.28	0.00	0.00		
<hr/>					
TOTAL	207	4	71	282	100.00
	73.40	1.42	25.18		

FREQUENCY MISSING = 194

Table 10

TABLE OF Q1 BY Q24

Q1 (ID #)	Q24 (CME-DIAG/TREAT)			TOTAL
FREQUENCY	YES	NO		
PERCENT				
ROW PCT				
COL PCT				
RURAL	179	255	42	297
		71.63	11.80	83.43
		85.86	14.14	
		84.72	76.36	
URBAN	30	46	13	59
		12.92	3.65	16.57
		77.97	22.03	
		15.28	23.64	
TOTAL		301	59	356
		84.55	13.45	100.00

FREQUENCY MISSING = 209

Desire coursework in:
Diagnosis and treatment

TABLE OF Q1 BY Q26

Q1 (ID #)	Q26 (CME-EVAL TESTS)			TOTAL
FREQUENCY	YES	NO		
PERCENT				
ROW PCT				
COL PCT				
RURAL	159	264	57	321
		68.04	14.69	82.73
		82.24	17.76	
		85.44	72.15	
URBAN	22	45	22	67
		11.60	5.67	17.27
		67.16	32.84	
		14.56	27.85	
TOTAL		309	79	388
		79.64	20.36	100.00

FREQUENCY MISSING = 177

Evaluation of test
results

TABLE OF Q1 BY Q28

Q1 (ID #)	Q28 (CME-CHRONIC EFF)			TOTAL
FREQUENCY	YES	NO		
PERCENT				
ROW PCT				
COL PCT				
RURAL	133	278	65	343
		67.80	15.89	83.66
		81.05	18.95	
		85.28	77.38	
URBAN	22	48	19	67
		11.71	4.63	16.34
		71.64	28.36	
		14.72	22.62	
TOTAL		326	84	410
		79.51	20.49	100.00

FREQUENCY MISSING = 155

Chronic Effects