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PESTICIDE USE AROUND A RURAL MEDICAL CENTRE ASSOCIATED WITH HEALTH PROBLEMS IN PATIENTS AND STAFF

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ABSTRACT

On a morning of July 1999, the lawn of a rural medical facility was sprayed with an organophosphate (Chlorpyrifos) without any warning to staff and patients. Patients waiting to enter the building were exposed due to proximity of spraying and windy conditions. A physician walked through a cloud of spray. Details about the concentration of pesticide used were not available but use of a high concentration was probable. Exposure was suspected to have continued inside the building through opened windows, air exchanger, and people movements through the doors. Within one to two hours all the staff experienced different levels of eye, throat and skin irritation, dry burning lips, metallic taste, nausea, lightheadedness, headaches, chest tightness and difficulty concentrating. People were too sick to return to work in the afternoon and had to leave the next day after two hours in the building. During the following days, the physician most exposed experienced increased symptomatology and one asthmatic person bringing a patient was severely affected. Discontinuation of patient services, extensive and costly cleaning followed. The most affected physician kept experiencing symptoms upon reentry into the building and took a month of sick leave. The second physician also experienced symptoms inside the building. Inspection of the building showed an inadequate ventilation system and presence of carpets in heavily used areas that may have exacerbated the problem. Recurrence of symptoms among the staff and in some sensitive patients raised questions about safety of the building. Open discussion about options, further cleaning and improvements took place. Testing for residual levels of Chlorpyrifos in air and swab samples was negative. The most affected physician re-experienced symptoms after cleaning of ventilation ducts. Six months after the initial event, there is no complaint outside some very sensitive patients who experience symptoms. This event showed that affected individuals may continue to experience symptoms after initial exposure due to a combination of factors, and that such events could have been easily prevented.

KEYWORDS: pesticides, contamination, symptoms, hypersensitivity

INTRODUCTION

Herbicides for lawn care are widely used in North America. There is currently no law regulating the use of these pesticides for individual properties. Several studies have shown health effects related to acute and chronic exposure to Organophosphate (OP) pesticides, ranging from cancer [1-6] to potential developmental problems [6-11] , while industry sponsored expert group or studies [12-13] and other review panels [14] have stressed the safety of herbicides when used normally. While most studies have looked at occupational

exposures [2-4], or persistence and measurement of byproducts [15-17], there is very little data about how these outside exposures can affect individuals in small buildings, outside of acute exposures [18]. We report on a cluster of individuals affected by spraying of the pesticide Chlorpyrifos around a small rural health care facility, and how this situation has affected the entire community.

METHODS

Interviews with affected individuals and local community members have been used to investigate the sequence of events. A walk through the facility looked at the structure of the facility, as well as heating, cooling and ventilation system. A local environmental consultants' firm was contracted by the community board to assess the facility and test for the presence of Chlorpyrifos 3 weeks after the initial incident, and after an initial cleanup of the facility. Two air samples were taken using an Alpha sampler, with calibrated air flow, for 8 hours, in areas where odours had been reported to be the strongest. One air sampler was located in the centre of the clinic reception, about 3 feet above the floor and the other one was placed in one examining room at the same height. One hexane wetted cotton swab sample (100 cm^2)was obtained from the inner lining surface of the air exchange unit and a second sample was obtained from loose packed insulation above the ceiling line. Two blanks were submitted for analysis.

RESULTS/EVENTS

The context

The affected medical centre is a 6-year old one storey building of wood construction covering approximately 218 m^2. It is located in a rural town in Nova Scotia, Canada. The facility consists of a reception room, several offices and examining rooms. A single small air exchange unit provides fresh air to the whole facility. In the summer time a separate cooling system is used, and windows are often kept opened. A large lawn area surrounds the facility. The facility was built entirely by the local community in an effort to attract doctors to the area and is administered by a board of directors. This board of directors has a contract with a local lawn maintenance company which regularly sprays the grounds around the clinic for purely aesthetic reasons. The doctors and staff had requested that this practice be stopped as it was felt to be unnecessary, expensive and potentially harmful to the environment. This request was ignored by the board.

Sequence of events.

A morning of July 1999, without prior notice, the lawn was sprayed with an organophosphate pesticide, Chlorpyrifos at an unknown concentration. The wind was blowing and patients waiting outside the clinic before opening developed symptoms. One of the doctors walked from his car to the clinic through a cloud of spray. Within one to two hours all the staff experienced varying degrees of symptoms such as eye, throat and skin irritation, dry burning lips, metallic taste, nausea, lightheadedness, headaches, chest tightness and difficulty concentrating. At that time, some windows were opened since it was a warm day, and the ventilation system was functioning. Since the staff was too unwell, the clinic closed at noon. The clinic reopened the following day, but after two hours the staff had to leave due to reappearance of symptoms. On the third day, the doctor who had walked through the spray was too sick to return to work, and the other doctor and one secretary returned to work for the

morning and developed again some symptoms. A person who brought her mother to the clinic and had no knowledge of the problem suddenly became very ill, coughing, wheezing, with shortness of breath, with cyanotic lips. She was given an adrenaline injection. After these events, the clinic closed for a month while a cleanup operation was attempted. Every item was thoroughly washed, replaced or discarded. Walls and floor were washed, and the carpeted areas cleaned. Patients' files remained initially untouched. The air ventilation ducts were vacuumed, but inspection revealed that dust was still present in the air transfer ducts, and the air exchange filter and foam pads had not been changed since the pesticide application. Nevertheless, the samples taken by the consulting company 3 weeks after the incident revealed no detectable levels of Chlorpyrifos in the air sample and swabs.

Despite the cleanup procedures, the most affected physician took a one month sick leave as his few attempts to come back to the facility were marked by reoccurrence of some of the initial symptoms. The second physician also experienced frequent throat clearing and burning eyes and became quite worried that his and all the other staff's health could be affected by chronic exposure. The young secretarial staff voiced some concerns about potential reproductive effects. This prompted a call to the Nova Scotia Environmental Health Centre which is a centre mandated by government to do treatment and research in the area of environmental sensitivities. After discussion a site visit to the facility was agreed and a meeting was organized with some community board members, staff, and department of health representatives to discuss options.

A quick walk through of the building identified a ventilation system of a very small capacity for this type of facility. Presence of carpets was also noted. Discussion with the different parties revealed:

- major concerns from the staff to stay in the current facility with fear for their future health,
- the practical impossibility to relocate the clinic facility due to costs,
- the widespread use of pesticides in the area,
- the unwillingness from some community board members to accept that it was not just a psychological phenomenon,
- the increased sensitivity of affected staff to other types of exposures,
- existence of symptoms that predated the incident, such as chronic headaches in the central part of the facility where patient records were located and secretarial staff worked, with minimal ventilation.

An agreement was reached to further clean areas that had not been cleaned, improve the ventilation system and photocopy all the patients files since one of the physicians experienced some symptoms after handling them.

Six months after the initial incident, follow-up interviews revealed that the clinic is back to normal, the ventilation system is been upgraded, all the staff is working without any unusual symptoms. The most affected physician had some difficulties after returning to the clinic, and became more symptomatic for a few days at the time of duct cleaning.

DISCUSSION

Chlopyrifos (CPF) is an organophosphate pesticide. It is an acetylcholinesterase (AchE) inhibitor. Acetylcholinesterase is an enzyme that hydrolyzes the neurotransmitter acetylcholine at neuromuscular and synaptic junctions. The literature on the effects of chlorpyrifos exposure on human health stresses effect of acute poisoning [11, 14, 18], long term effects with increased cancer incidence in exposed individuals [1-5], potential genotoxic and neuro-developmental effects [6-11, 19]. Nevertheless, an industry sponsored expert panel report reviewing the current literature [12] and another expert panel [14] did not find significant effects of exposures outside of acute poisoning. While pesticides such as CPF are commonly used outdoors, their concentration in the indoor environment usually exceeds their outdoor concentrations, with skin being an important source of exposure [17].

This case study shows that there might be other more common effects of pesticide exposures in the indoor environment that go unreported since the literature might not focus on such case studies. These events show the enormous costs associated with what was a purely cosmetic concern. In addition, an important amount of stress generated by persistence of symptoms and fear of the potential effects could have been easily avoided. The type of health effects reported in this study may not fit with the classical effects of pesticide exposures. Nevertheless, these symptoms must be considered as real, not purely psychogenic. All the effects produced by pesticides may not be all due to cholinergic effects [6] and might also be due to adjuvants [19]. As the working party of the Royal College of Physicians and the Royal College of Psychiatrists mention in their report, "On approaching unexplained physical symptoms, many patients and doctors have an overly simplistic view dominated by mind-body dualism (i.e. that a disorder must be either physical or psychological). This is both outmoded and unhelpful" [20].

In working on this issue, it was essential to take the issue seriously, listen, find solutions that would satisfy both parties, and accommodate as much as possible the affected individuals and reassure them. Data are needed that look at long term sensitization, cognitive and behavioral effects of pesticide exposures that might not be life threatening but have costly consequences and impair day to day functioning in a significant way.

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