A SURVEY OF EUROPEAN (*VESPULA* SPP.) AND PAPER WASP (*POLISTES* SPP.) INJURIES IN URBAN AUCKLAND

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SUMMARY

A monthly record of the number of people seeking treatment for wasp stings was kept by 50 general practitioners from 18 medical centres and four accident and emergency departments in urban Auckland. From December 1991 to April 1992, 75 people received treatment for wasp stings at the medical practices surveyed. In one third of all cases the wasp was identified. The ratio of *Vespula*: *Polistes* stings was 7:6. Fewer injuries were reported from central Auckland than outer suburbs. It is estimated that for the entire Auckland region 804 people sought advice and treatment from general practitioners, at a cost of between \$33,000 and \$35,000.

Keywords: wasp stings, survey, *Vespula* sp., *Polistes* sp.

INTRODUCTION

Vespid wasps interfere with horticultural, forestry and sawmilling operations and compete with other insects and birds for food resources (Moller *et al* 1991; Harris 1991). Near-fatal wasp attacks occur and one child has died in New Zealand. In many cases it is not the stinging but the threat of being stung which disrupts work and recreational activities. There is as yet no measure of the costs to human health in New Zealand resulting from vespid (vespine and polistine) wasp attacks. Worldwide there are virtually no statistics for the number of people stung by wasps but records of deaths by stings are occasionally available. In England there was an average of 3.3 deaths per year from 1949 to 1969, in Japan 170 people died of hymenopteran stings from 1979-83, and in the United States 15-20 people die each year from stings of vespids including *Polistes* spp. (Matsuura and Yamane 1984). In many cases deaths are diagnosed incorrectly as heart attacks (Akre *et al* 1980). In any case, these statistics represent a very small proportion of the number of people actually stung by vespid wasps and are therefore an incomplete measure of the cost to the human population.

Vespid venoms are chemically complex and consist of low molecular weight amines and peptides, and high molecular weight enzymes (Nakajima 1986). Amines such as histamine, tyramine, catecholamines and serotonin are thought to be the substances involved in the cutting pain that occurs during a sting. Other pain-producing substances include the wasp kinins and a histamine-releasing peptide, mastaparan. Together with vespid chemotactic peptides (Ves-CPs), these compounds play an important role in enhancing the inflammatory effects of wasp stings. In addition to the direct toxic action of enzymes such as collagenase, neuraminidase and phospholipase, some are potent allergens. A vespid neurotoxin, mandaratoxin, has also been isolated.

Seventy percent of sting-induced deaths are caused by respiratory failure. Incidence of anaphylactic shock is much lower than respiratory failure. Anaphylaxis is characterised by vascular engorgement, congestion of internal organs, alveolar rupture, coronary occlusion and generalised haemorrhage. Venom from wasps is faster acting than that from any other venomous animal including spiders, snakes and scorpions (Parrish 1963). In 80% of fatalities death occurs within 1 hour and 92% of the victims die within 5 hours.

Four species of vespid wasps are established in New Zealand. The two paper wasps, the Asian paper wasp (*Polistes chinensis*) and the Tasmanian paper wasp (*P. humilis*) are present in the northern North Island. The Asian paper wasp has been found

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in Nelson (J. Beggs pers. comm.) and is expected to spread throughout New Zealand. The German wasp (*Vespula germanica*) arrived in the 1940s and is widespread, but in some regions it is being ousted by the more recent immigrant, the common wasp (*V. vulgaris*). The aim of this survey was to determine the frequency of injuries in residential areas of Auckland caused by vespid wasps. The wider implications of wasp attacks and associated costs are discussed.

METHOD

Wasp injury recording sheets were sent to 50 general practitioners from 18 medical practices, representative of all the suburban areas, in Auckland from December 1991 to April 1992. This corresponded to the season of wasp activity. Accident and Emergency departments from four major public and private hospitals in the city also participated in the survey. No personal information or details of the injury were sought but the type of wasp inflicting the damage was recorded if known.

RESULTS AND DISCUSSION

From December to April inclusive, 75 people received treatment for wasp injuries at the medical practices surveyed (Table 1). Five out of 18 of the medical practices recorded no injuries from wasps. As expected the frequency of injuries increased in late summer but there was a drop in February which may have corresponded to the introduction of health charges in that month. The wasp menace was considered to be low during the study period with unseasonably cold temperatures in April. For example, the number of unsolicited telephone enquiries about wasps handled by the D.S.I.R. at Mt Albert in January and February this year was down 30% on the previous year for *Vespula* species and down 70% for *Polistes* spp.

TABLE 1: The number of people seeking treatment for wasp injuries from general practitioners (GPs) and Accident and Emergency (A & E) clinics surveyed in Auckland from December 1991 to April 1992.

Month	GPs (50)	A & E clinics (4)	Total
December	5	7	12
January	14	6	20
February	9	3	12
March	17	12	29
April	2	0	2
Total	47	28	75

In one third of all the cases reported, the species of wasp inflicting the damage was known to the victim. The ratio of stings by *Vespula*: *Polistes* species was 7:6. A total of six stings were recorded from 16 general practitioners participating in the central city compared with 1.0 to 1.5 per practitioner for the outlying areas (Table 2).

TABLE 2: Geographical distribution of stings reported to general practitioners (GPs) in Table 1 and estimates of the total for urban Auckland

Region	No. GPs surveyed	Total no. GPs in region	No. stings reported	Total no. stings estimated
Central	16	345	6	129
West Auckland	12	117	12	117
Nth Harbour	12	208	14	243
Sth Auckland	10	210	15	315
Total	50	880	47	804

Medical costs for treatment of a wasp injury in the Auckland area are estimated at \$32-34 for the consultation fee and immediate treatment, and a further \$10 prescription charges for antihistamines and antibiotics (M. Hodder, Auckland Medical Association pers. comm.). The costs of treatment for insect bites are not covered by the Accident Compensation Corporation. With 880 general practitioners in the area surveyed, it is estimated that the number of people treated was 804 excluding those visiting Accident and Emergency Clinics at hospitals. An estimate of the costs of treatment by a general practitioner is therefore in the range \$33,900 to \$35,500 for the area this year. It is not possible to estimate the costs associated with treatment at the larger public and private hospitals as their clients come from all over the city. These facilities mainly deal with patients who are in anaphylactic shock and require hospitalisation (Charge nurse A. Shipperlee, Middlemore Hospital pers. comm.). Other costs associated with wasp injuries include loss of time from work but this was not estimated here.

People suffering unusually strong reactions to wasp stings are highly likely to build up antibodies to the venom that will result in a more severe allergic reaction from future stings (Fluno 1961). Parrish (1963) found that of 229 hymenopteran deaths 7% of the victims were under 20 years of age and 89% were older than 30 years. This was attributed to the development of venom allergy over time. The cost of medical treatment for hymenopteran hypersensitivity is high and is likely to be recommended for life. In the United States an estimated 4.5 million people (2% of the population) are hypersensitive to hymenopteran venom (Schmidt 1986). The success rate of immunotherapy is no more than 15% (Rubenstein 1982). Cross reactivity between hymenopteran species has also been recorded and can extend to other allergic reactions such as asthma. The cost of a desensitizing course in New Zealand is around \$1000 (R. Ameratunga, Auckland Medical School, pers. comm.).

We conclude that in the Auckland area, during a summer when wasp numbers were lower than usual, these insects were still a serious threat to human health. The immediate danger is the fast action of the venom causing respiratory failure or anaphylactic shock. Treatment with antihistamines and antibiotics and long term immunotherapy for allergic reactions adds to the costs of these injuries. This study has also indicated that the polistine species are a significant human health hazard in this region.

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