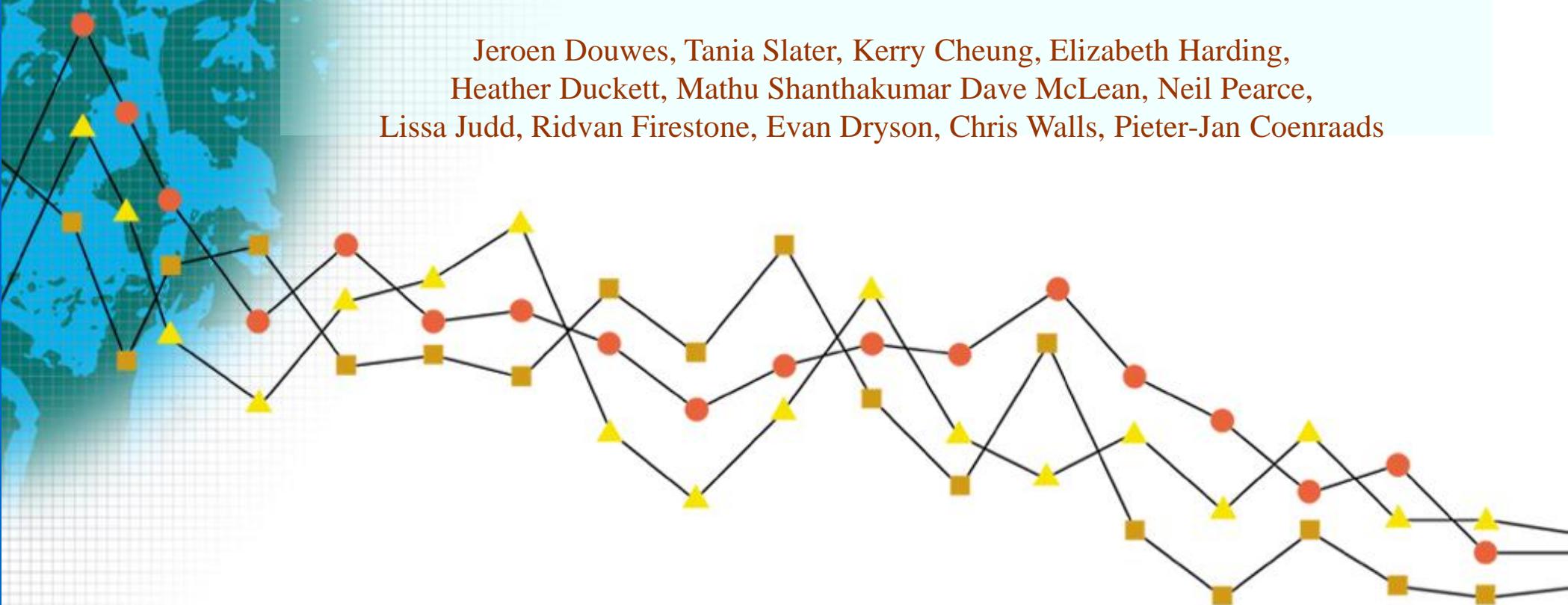


Occupational dermatitis in New Zealand cleaners

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Te Kunenga ki Purehuroa

BROHNZ Building Research
in Occupational Health
in New Zealand



Occupational dermatitis: Background

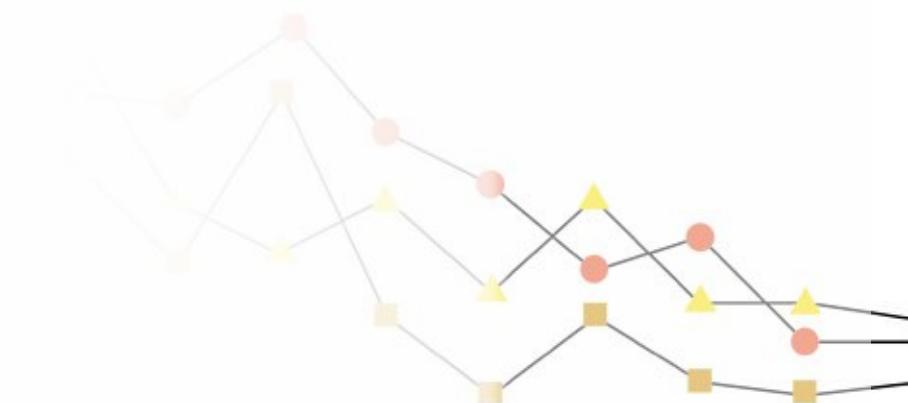
- Occupational dermatitis has been estimated to account for up to 40-70% of the total burden of occupational disease.
- In Germany and Italy, occupational dermatitis accounts for more than 50% of workers' compensation for occupational disease.
- Incidence rates estimated to be in the order of 0.5-1.9 cases per 1,000 workers per year, with wide variations in estimates between countries and specific occupations.
- The true incidence is likely to be higher since occupational dermatitis is often severely underreported.





Occupational dermatitis: Background

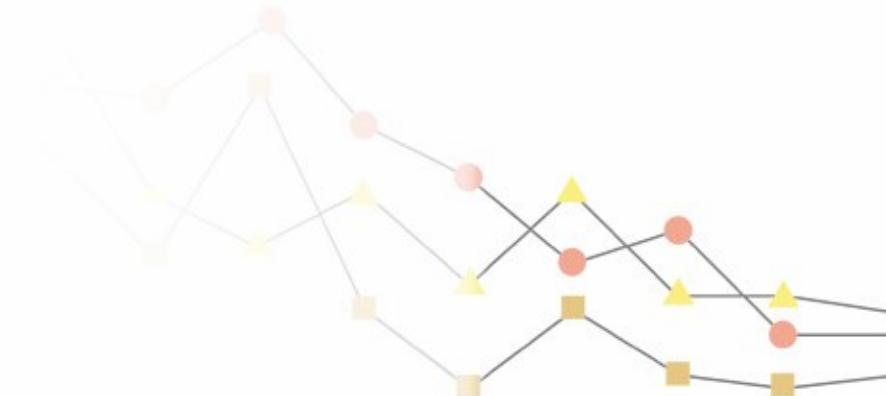
- Although not life threatening, morbidity is substantial with a reported average loss of 11 work days annually in 20-25% of subjects with occupational dermatitis in the USA (US Bureau of labor statistics, 1997).
- Others have suggested that occupational skin disease is responsible for 25% of all lost work days (Peate, 2002).
- Occupational dermatitis is likely to develop into a chronic condition (Meding et al., 2005)





Occupational dermatitis in New Zealand

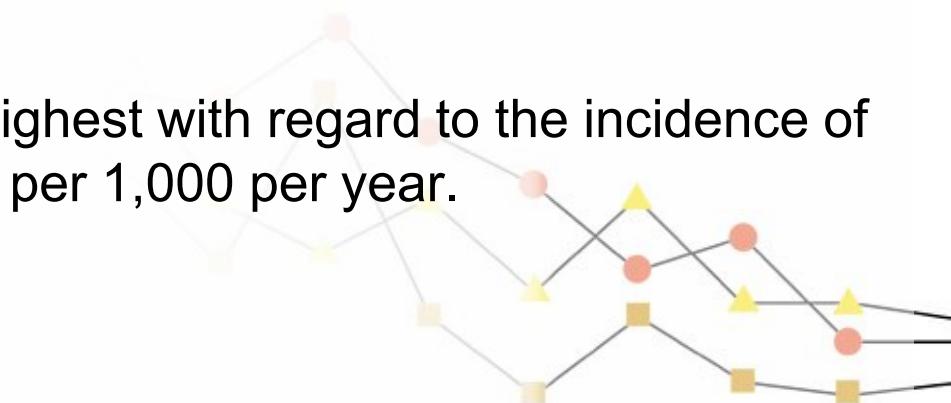
- The NOHSAC Burden of Occupational Disease and Injury report estimates skin disorders to be the third highest incident occupational disease.
- good prevalence and/or incidence data on occupational dermatitis are currently lacking in New Zealand.
- occupational dermatitis has long been neglected in occupational medicine in New Zealand and research capacity building in this area is urgently required.





Occupational dermatitis (OD) in cleaners: Background

- Surveillance schemes (EPIDERM and OPRA) show that occupational dermatitis is most frequently attributed to:
 - rubber chemicals, **soaps, detergents and other cleaning products, and wet work.**
- NOHSAC identified **wet work** as one of the main risk factors for occupational dermatitis.
- Cleaners are believed to have a high risk of OD due to the combination of wet work, exposure to irritants and increased mechanical stress.
- In Denmark cleaners rank highest with regard to the incidence of notified OD with 13.2 cases per 1,000 per year.





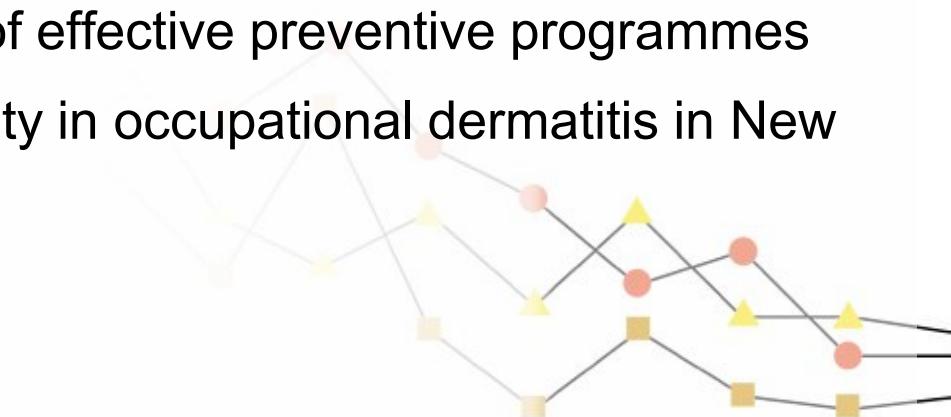
Prevalence of occupational dermatitis in cleaners

Study	Cleaners	Prevalence	Other findings
Singgih <i>et al.</i> , 1986	356 hospital cleaners	12% mod/severe 10% in men 19% in women	In 88%, the dermatitis had a duration of more than two years
Nielsen, 1996	>1,000 female cleaners employed at nursing homes, schools and offices	43% had at least one out of four skin symptoms during a one-year period.	72% reported improvements during weekends/holidays. During 2-year follow-up, the risk of developing skin symptoms was greater in the group that remained working as cleaners than in the group that left their cleaning jobs.
Gawkrodger <i>et al.</i> , 1986	Female hospital cleaners	35% reported skin disorders; 12% was diagnosed as hand dermatitis	Most of it was irritant in origin and related to wet work.



Occupational dermatitis in New Zealand cleaners: Study aims

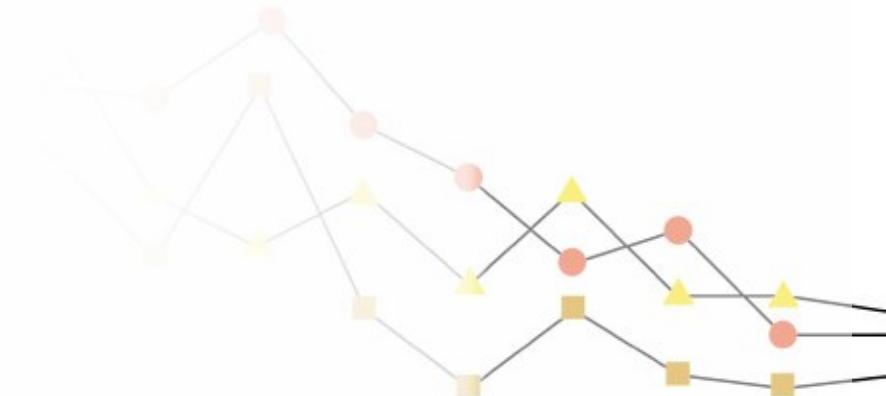
- To assess the prevalence of occupational dermatitis in cleaners
- To identify which agents and work processes cause occupational dermatitis in cleaners
- To assess whether atopy increases the risk of OD
- To assess whether frequency of wet work and exposure to specific cleaning agents are associated with impaired skin barrier function
- To guide the development of effective preventive programmes
- To develop research capacity in occupational dermatitis in New Zealand.





Prevalence and causes of occupational dermatitis in New Zealand cleaners

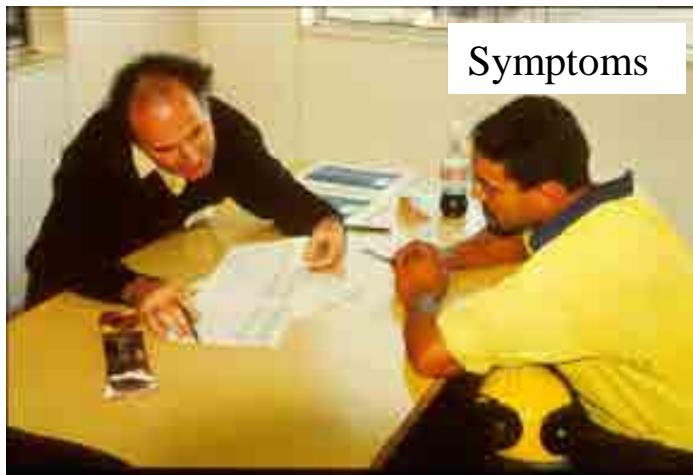
- Cross-sectional study of 425 cleaners recruited through the Service and Food Workers Union (SFWU) and organisations that employ or contract cleaners; **Response rate 74%**.
- External control group: 281 “non-exposed” workers from the retail industry and bus drivers; **Response rate 34%**.
- Internal control group: those cleaners that had no or low exposures to particular risk factors e.g. wet work.





Prevalence and causes of occupational dermatitis in New Zealand cleaners

- Methods



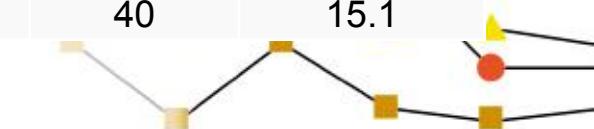
Exposure





Demographic characteristics for the cleaners and reference workers

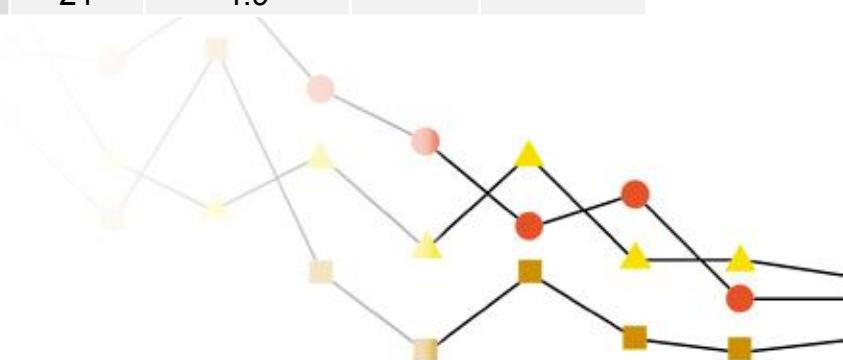
	Cleaners (n=425)		Reference workers (n=281)	
	n	%	n	%
Sex				
Males	97	22.8	142	50.5
Females	328	77.2	139	49.5
Ethnicity				
Pakeha	141	33.2	189	67.3
Māori	114	26.8	38	13.5
Pacific	118	27.8	29	10.3
Other	49	11.5	24	8.5
Smoking status				
Current smoker	178	41.9	81	28.8
Ex-smoker	59	13.9	75	26.7
Non-smoker	188	44.2	124	44.1
	mean	SD	mean	SD
Age	45	12.9	40	15.1



Job details for cleaners and reference workers



	Cleaners (n=425)		Reference group (n=281)	
	Mean	SD	Mean	SD
Years worked in current job (yrs)	8.5	8.61	6.2	7.13
Number of hours/week worked as a cleaner	33.8	12.08	-	-
	n	%	n	%
Involved in cleaning activities in current job (y/n)	425	100.0	134	47.7
Type of cleaning work				
Homes/schools/offices/shops/hotels	328	77.2	-	-
Hospitals/pharmacies	138	32.5	-	-
Café/Restaurant/Kitchens	63	14.8	-	-
Industrial	75	17.6	-	-
Outside	21	4.9	-	-





Eczema in cleaners and the reference group

Symptom	Cleaners (n=418)		Reference group (n=279)		OR (95% CI) ¹
	n	%	n	%	
Last had eczema on hands, wrists, forearms					
I have it now	43	10.1	19	6.8	1.92 (1.14-3.23)*
Not now but within the past 3 months	20	4.7	9	3.2	< 3 months vs >3
Between 3-12 months ago	14	3.3	10	3.6	months or never
More than 12 months ago	26	6.1	24	8.5	
First had eczema on hands, wrists, forearms					
Below 6 years of age	11	2.6	14	5.0	1.77 (1.09-2.88)*
Between 6 and 14 years of age	12	2.8	8	2.8	>18 yrs vs <18 or
Between 15 and 18 years of age	5	1.2	9	3.2	never
Above 18 years of age	75	17.6	32	11.4	
Visited doctor as an adult for hand, wrists or forearm eczema (y/n)	59	13.9	30	10.7	1.50 (0.89-2.51)
Chemicals at work worsen eczema (y/n)	53	12.5	25	8.9	1.58 (0.91-2.75)
Chemicals outside work worsen eczema (y/n)	34	8.0	23	8.2	0.96 (0.52-1.77)
Eczema improves when away from work					
Yes, usually	42	9.9	15	5.3	2.51(1.42-4.43)**
Yes, sometimes	20	4.7	6	2.1	Yes vs no
Eczema affects daily activities in occupation (y/n)	28	6.6	11	3.9	1.80 (0.82-3.92)

¹ Adjusted for age, sex, ethnicity, smoking

* p<0.05; ** p<0.01; p<0.001

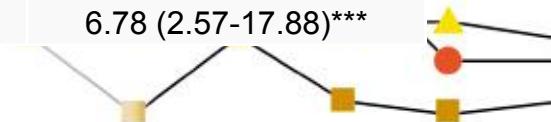


Itchy wheals and symptoms due to glove use in cleaners and the reference group

Symptom	Cleaners (n=418)		Controls (n=279)		OR (95% CI) ¹
	n	%	n	%	
Last have itchy wheals					
During the past 7 days	24	5.6	6	2.1	2.37 (1.23-4.56)**
7 days to 3 months ago	23	5.4	9	3.2	<3 months vs >3 months
3-12 months ago	22	5.2	12	4.3	or never
Over a year ago	31	7.3	20	7.1	
First got itchy wheals					
Below 6 years of age	4	0.9	7	2.5	1.68 (0.95-2.95)
Between 6 and 14 years of age	23	5.4	11	3.9	>18 yrs vs <18 yrs or
Between 15 and 18 years of age	9	2.1	8	2.8	never
Above 18 years of age	64	15.1	21	7.5	
Visited a doctor as an adult because of itchy wheals (y/n)	38	8.9	6	2.1	3.59 (1.43-9.06)**
Ever been diagnosed with skin allergy (y/n)	62	14.6	43	15.3	0.97 (0.61-1.55)
Skin symptoms related to glove use					
Skin symptoms due to gloves (y/n)	103	24.2	19	6.8	3.87 (2.22-6.74)***
Changed glove type or stopped using gloves due to skin symptoms (y/n)	51	12.0	5	1.8	6.78 (2.57-17.88)***

¹ Adjusted for age, sex, ethnicity, smoking

* p<0.05; ** p<0.01; *** p<0.001





Atopy and trans-epidermal water loss in cleaners and the reference group

- No differences in atopy between cleaners and the reference group
- TEWL:

	Cleaners		Reference group			
	n=289		n=273		Difference ¹	
	Mean ²	SD	Mean ²	SD	Mean ²	p-value
Trans-epidermal water loss						
Back of hand	7.8	3.74	6.9	2.86	1.07	0.0004
Top forearm	7.1	3.08	6.7	2.14	0.49	0.0425
Volar forearm	7.8	3.16	6.8	2.25	1.22	<0.0001
Upper arm	7.3	2.82	7.6	4.84	0.04	0.9212

¹ Adjusted for age, sex, ethnicity, smoking

² Unit: grams/meter²/h

- No association between TEWL and symptoms





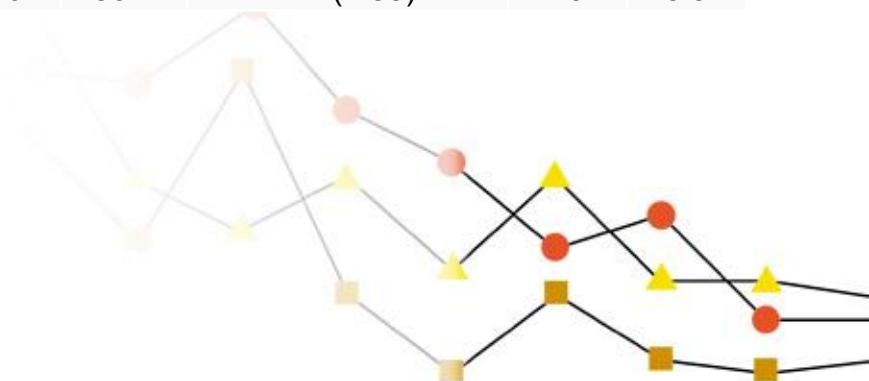
Hand contact with water, glove usage and skin care products

	Cleaners n=425		Reference group n=281	
	N	%	n	%
Using protective gloves at work (y/n)				
Yes, at present	375	88.2	76	27.0
Yes, but not at present	29	6.8	49	17.4
Frequency of hand washing				
0-5 times per day	122	28.7	85	30.2
6-10 times per day	137	32.2	134	47.7
11-20 times per day	92	21.6	46	16.4
More than 20 times per day	74	17.4	15	5.3
Hands exposed to water without gloves				
Not at all	162	38.1	175	62.3
Less than 1/2 hour per day	149	35.1	85	30.2
1/2 hour - 2 hours per day	61	14.4	14	5.0
2-5 hours per day	35	8.2	5	1.8
More than 5 hours a day	18	4.2	1	0.4
Hands exposed to cleaning products without gloves				
Not at all	220	51.8	144	51.2
Less than 1/2 hour per day	103	24.2	113	40.2
1/2 hour - 2 hours per day	56	13.2	20	7.1
2-5 hours per day	32	7.5	3	1.1
More than 5 hours a day	14	3.3	0	0.0
Use of skin care products				
Moisturiser	252	59.3	135	48.0
Barrier cream	40	9.4	17	6.0
Other	41	9.6	25	8.9
No products	128	30.1	121	43.1



Use and duration of specific cleaning agents for cleaners and the reference group

Cleaning agents	Cleaners			Reference group	
	n=425			n=281	
	n	%	Duration in hrs/day mean (SD)	n	%
Detergents/washing powders (y/n)	179	42.1	1.1 (2.1)	44	15.7
Polishes, waxes (y/n)	82	19.3	0.5 (1.5)	8	2.8
Liquid multi-use cleaning products (y/n)	142	33.4	1.0 (2.03)	68	24.2
Bleach (Janola, Domestos, Cholorsan) (y/n)	163	38.4	1.0 (2.12)	27	9.6
Ammonia (Mr Muscle ammoniated floor & general purpose) (y/n)	58	13.6	0.3 (1.23)	19	6.8
Decalcifiers, acids (liquid scale removers) (y/n)	26	6.1	0.3 (1.40)	4	1.4
Solvents, stain removers (y/n)	26	6.1	0.2 (1.08)	18	6.4
Other cleaning products (y/n)	366	86.1	4.4 (4.55)	25	8.9



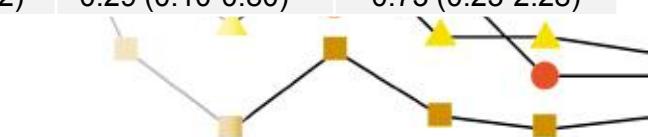


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The association between exposures and skin symptoms in cleaners (n=425)

Exposure	Eczema in past 3 months	Eczema >18 yrs	Itchy wheels in past 3 months	Itchy wheels >18 yrs
OR (95% CI) ¹				
Years worked as a cleaner				
< 3 years (n=134)	Ref	Ref	Ref	Ref
3-10 years (n=141)	0.86 (0.41-1.78)	0.76 (0.39-1.48)	2.35 (1.03-5.34)*	1.96 (0.93-4.12)†
>10 years (n=150)	1.36 (0.62-3.00)	0.91 (0.45-1.85)	1.46 (0.55-3.90)	2.05 (0.89-4.73)
Type of cleaner				
Homes/schools/offices/shops/hotels (n=175)	Ref	Ref	Ref	Ref
Hospital (n=126)	0.75 (0.37-1.53)	0.41 (0.20-0.87)	0.77 (0.37-1.58)	0.83 (0.44-1.58)
Café/restaurant/kitchen (n=32)	1.27 (0.47-3.43)	1.61 (0.66-3.94)	0.81 (0.26-2.53)	1.09 (0.41-2.91)
Industrial/Aircraft (n=67)	0.87 (0.37-2.04)	2.03 (0.98-4.21)*	0.19 (0.04-0.85)**	0.22 (0.06-0.79)**
Outside (n=21)	1.08 (0.33-3.55)	1.88 (0.65-5.40)	0.30 (0.04-2.38)	1.08 (0.33-3.55)
Washing clothes/linen by hand				
<1 day/week (n=398)	Ref	Ref	Ref	Ref
1-7 days/week (n=27)	2.57 (0.58-11.31)	3.18 (0.73-13.84)	0.72 (0.23-2.22)	1.15 (0.38-3.51)
Cleaning industrial machinery				
<1 day/week (n=368)	Ref	Ref	Ref	Ref
1-7 days/week (n=57)	1.21 (0.50-2.91)	0.57 (0.27-1.18)	7.56 (0.98-58.18)†	5.22 (1.19-22.84)*
Using protective gloves at work (y/n)	3.24 (0.42-25.13)	4.39 (0.57-33.77)	0.52 (0.16-1.69)	0.65 (0.20-2.07)
Hand drying after washing				
Sometimes/Occasionally/never (n=403)	Ref	Ref	Ref	Ref
Almost always/often (n=22)	0.88 (0.28-2.77)	1.01 (0.33-3.12)	0.29 (0.10-0.80)**	0.73 (0.23-2.28)

¹ Adjusted for age, sex, ethnicity, smoking
Ref = reference; †p<0.10; *p<0.05; **p<0.01





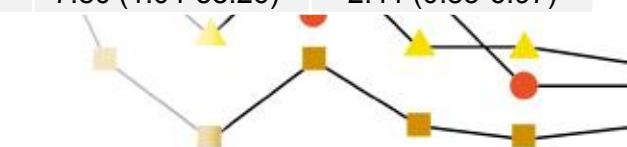
BROTHMAN

The association between exposures and skin symptoms in cleaners (n=425)

Exposure	Eczema in past 3 months	Eczema >18 yrs	Itchy wheels in past 3 months	Itchy wheels >18 yrs
OR (95% CI) ¹				
Hands exposed to water without gloves				
Not at all (n=220)	Ref	Ref	Ref	Ref
Less than 1/2 hour per day (n=103)	2.30 (1.14-4.62)*	1.93 (1.05-3.54)*	1.33 (0.64-2.74)	1.56 (0.83-2.92)
1/2 hour - 2 hours per day (n=56)	2.67 (1.14-6.22)*	1.48 (0.66-3.31)	0.87 (0.30-2.52)	0.77 (0.29-2.02)
2-5 hours per day (n=32)	1.85 (0.64-5.34)	1.34 (0.49-3.66)	0.83 (0.22-3.09)	0.85 (0.27-2.69)
More than 5 hours a day (n=14)	2.59 (0.73-9.19)	1.81 (0.53-6.15)	3.40 (1.04-11.14)*	2.12 (0.67-6.72)
Hands exposed to cleaning products w/o gloves				
Not at all (n=162)	Ref	Ref	Ref	Ref
Less than 1/2 hour per day (n=149)	1.92 (1.02-3.61)*	1.78 (0.99-3.20)†	1.91 (0.89-4.09)	1.97 (1.02-3.78)*
1/2 hour - 2 hours per day (n=61)	1.61 (0.72-3.60)	1.05 (0.47-2.36)	1.49 (0.55-4.05)	1.03 (0.40-2.69)
2-5 hours per day (n=35)	0.46 (0.10-2.07)	0.38 (0.09-1.67)	2.66 (0.94-7.51)	2.69 (1.07-6.74)*
More than 5 hours a day (n=18)	1.08 (0.22-5.27)	3.23 (1.00-10.47)*	6.46 (1.90-22.02)**	5.51 (1.73-17.59)**
Use of skin care products				
No products (n=128)	Ref	Ref	Ref	Ref
Moisturiser (n=234)	0.85 (0.43-1.69)	0.65 (0.35-1.20)	0.79 (0.38-1.68)	0.85 (0.45-1.61)
Barrier cream (n=40)	2.73 (1.13-6.64)*	2.37 (1.07-5.26)*	1.79 (0.65-4.92)	1.22 (0.46-1.41)
Other (n=23)	3.49 (1.24-9.87)**	1.42 (0.50-4.07)	1.58 (0.45-5.50)	1.35 (0.43-4.19)
Other cleaning products (y/n) (n=366)	4.26 (1.26-14.43)**	2.77 (1.05-7.29)*	7.80 (1.04-58.26)*	2.41 (0.83-6.97)

¹ Adjusted for age, sex, ethnicity, smoking

Ref = reference; †p<0.10; *p<0.05; **p<0.01





The association between exposures and skin symptoms in cleaners (n=425)

Exposure	Eczema in past 3 months	Eczema >18 yrs	Itchy wheels in past 3 months	Itchy wheels >18 yrs
OR (95% CI) ¹				
Years worked as a cleaner				
< 3 years (n=134)	Ref	Ref	Ref	Ref
3-10 years (n=141)	0.78 (0.36-1.68)	0.69 (0.34-1.37)	2.51 (1.04-6.06)*	2.00 (0.92-4.38)
>10 years (n=150)	1.14 (0.50-2.60)	0.70 (0.33-1.46)	1.42 (0.50-4.05)	1.85 (0.77-4.47)
Cleaning industrial machinery				
<1 day/week (n=368)	Ref	Ref	Ref	Ref
1-7 days/week (n=57)	1.16 (0.38-3.58)	0.67 (0.26-1.70)	5.12 (0.53-49.09)	4.10 (0.82-20.58)
Using protective gloves at work (y/n) (n=404)	4.55 (0.54-38.58)	6.49 (0.79-53.36)	0.72 (0.18-2.82)	0.76 (0.21-2.76)
Hand drying after washing				
Sometimes/Occasionally/never (n=403)	Ref	Ref	Ref	Ref
Almost always/often (n=22)	0.91 (0.26-3.15)	1.31 (0.40-4.31)	0.22 (0.07-0.72)**	0.62 (0.18-2.19)
Hands exposed to water without gloves				
Not at all (n=162)	Ref	Ref	Ref	Ref
Less than 1/2 hour per day (n=149)	2.52 (1.22-5.23)**	1.93 (1.02-3.66)*	1.12 (0.51-2.45)	1.32 (0.68-2.59)
1/2 hour - 2 hours per day (n=61)	2.76 (1.10-6.93)*	1.29 (0.53-3.10)	0.51 (0.16-1.63)	0.45 (0.16-1.29)
2-5 hours per day (n=35)	3.07 (0.89-10.62)	1.68 (0.52-5.45)	0.38 (0.08-1.68)	0.41 (0.11-1.55)
More than 5 hours a day (n=18)	3.79 (0.91-15.71)	2.20 (0.56-8.66)	1.10 (0.26-4.66)	0.76 (0.20-2.94)
Hands exposed to cleaning products w/o gloves				
Not at all (n=220)	Ref	Ref	Ref	Ref
Less than 1/2 hour per day (n=103)	1.77 (0.90-3.47)	2.03 (1.07-3.82)*	1.85 (0.82-4.17)	1.93 (0.97-3.86)
1/2 hour - 2 hours per day (n=56)	1.06 (0.41-2.74)	0.92 (0.36-2.39)	1.24 (0.39-3.92)	0.91 (0.31-2.66)
2-5 hours per day (n=32)	0.25 (0.05-1.32)	0.39 (0.08-1.89)	2.01 (0.58-6.99)	2.60 (0.88-7.69)
More than 5 hours a day (n=14)	0.41 (0.07-2.46)	3.26 (0.83-12.83)	3.84 (0.91-16.25)	4.65 (1.20-18.00)**
Use of skin care products				
No products (n=128)	Ref	Ref	Ref	Ref
Moisturiser (n=234)	0.83 (0.40-1.71)	0.67 (0.35-1.27)	0.81 (0.37-1.76)	0.85 (0.44-1.66)
Barrier cream (n=40)	2.08 (0.80-5.37)	2.07 (0.88-4.84)	2.00 (0.68-5.83)	1.08 (0.39-3.00)
Other (n=23)	3.70 (1.23-11.10)**	1.49 (0.49-4.49)	1.44 (0.39-5.32)	1.12 (0.34-3.68)
Other cleaning products (y/n) (n=366)	4.02 (1.17-13.80)**	2.81 (1.05-7.50)*	6.74 (0.89-51.21)	2.26 (0.76-6.71)

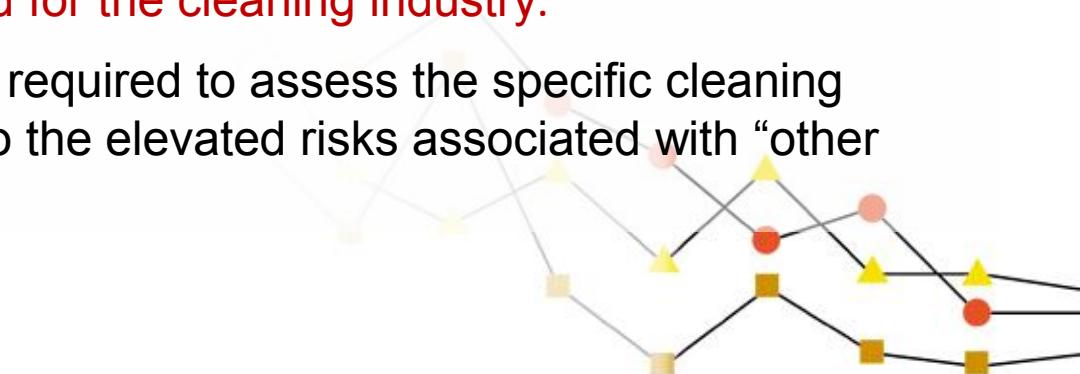
¹ Adjusted for age, sex, ethnicity, smoking and all other exposure variables in the table

Ref = reference; *p<0.05; **p<0.01



Conclusions

- Cleaners in NZ have an increased risk of work-related hand eczema and urticaria
- Atopy does not increase the risk of OD in cleaners
- **Modifiable risk factors identified as suitable targets for prevention:**
 - Time that workers' hands are directly exposed to water and/or cleaning agents
 - More appropriate use of protective gloves and hand care products
- Previous studies have shown that intervention programmes may be effective in reducing and preventing occupational dermatitis in other occupational groups, and similar types of programmes now need to be developed for the cleaning industry.
- Further analyses are required to assess the specific cleaning agents contributing to the elevated risks associated with “other cleaning products”





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