

Occupational Contact Dermatitis: Workers' Compensation Patch Test Results of Portland, Oregon, 2005–2014

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Background: Workers are exposed to potential irritants and allergens with constant introduction of new industrial chemicals in the workplace.

Objective: Characterize the final diagnoses, demographics, occupations, exposures, clinical presentations, patch test results, dermatologic histories, and risk factors of workers evaluated for suspected work-related allergic contact dermatitis (ACD).

Methods: A retrospective chart review of 310 workers' compensation independent medical examinations evaluated for suspected work-related ACD was performed. Workers were seen in a community dermatology clinic in Portland, Oregon, from 2005 to 2014. Evaluation included history, physical examination, patch testing, and further diagnostic workup when indicated.

Results: Hand dermatitis was the most common presentation ($n = 148$, 47.7%). Prevalent occupations included health care workers ($n = 51$, 16.5%), custodial staff ($n = 41$, 13.2%), and machinists ($n = 36$, 11.6%). Allergic contact dermatitis (47.5%) was more common than irritant contact dermatitis (ICD) (38.9%) in those diagnosed as having occupational skin disease ($n = 185$). The highest-frequency work-related allergens were thiuram mix (21 of 88, 23.9%), carba mix (20 of 88, 22.7%), potassium dichromate (9 of 88, 10.2%), and epoxy resin (9 of 88, 10.2%).

Conclusions: Allergic contact dermatitis and ICD are common occupational skin disorders. In this population of workers' compensation referrals, ACD was more common, with 73.3% of those cases work related, compared with 86.7% of ICD. Blue collar work and wet work were risk factors for the development of ACD and ICD.

The skin is particularly vulnerable to occupational illness or injury because of the large surface area exposed to the environment. Skin-related complaints are prevalent in occupational illness.^{1,2} Workers are exposed to thousands of known irritants and allergens at the workplace with a constant evolution of new industrial chemicals and potential allergens. Allergic contact dermatitis (ACD) affects more than 14 million Americans each year, with significant economic impact on workers and employers.³

Identifying the cause of ACD can be challenging because of the delayed reaction and required previous sensitization. Many workers present with suspected work-related ACD but are ultimately diagnosed as having other skin conditions that may look like ACD including infections, scabies, psoriasis, lichen planus, photodermatitis, urticaria, seborrheic dermatitis, and rosacea.⁴

The most common work-related rash is irritant contact dermatitis (ICD). Irritant contact dermatitis is a nonspecific inflammatory reaction of the skin occurring within minutes to hours of exposure to the offending substance with no previous exposure necessary.

Workers are frequently diagnosed as having ACD by first-line health care providers without confirmatory testing.^{5,6} These workers may be referred to a dermatologist with a special interest in occupational dermatology to provide confirmatory testing, usually patch testing. Workers suspecting an employment exposure as the cause of their dermatitis may file a workers' compensation claim.

Workers' compensation insurance is a type of medical insurance for employees injured on the job. The workers' compensation system is run on a state-by-state basis with a state-governing board that will oversee both private and public insurance carriers. In the state of Oregon, if an employer employs a worker, the employer is subject to providing workers' compensation insurance for the worker or workers. Federal employees are covered by Federal Workers Compensation Insurance.

In some states, the workers' compensation insurance carrier may request an independent medical examination (IME) by the appropriate specialist. An IME for occupational skin disease is a specialized inclusive examination of the worker, followed by a

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comprehensive written report performed by a physician with expertise and interest in occupational skin disease. The IME may be used to determine the compensability of a possible work-related skin condition, diagnosis of the skin condition, the cause and extent of a work-related injury or condition, impairment, treatment recommendations, and if the condition or injury is not expected to improve with further treatment or the passage of time (medically stationary status).

Although an IME shares many similarities with other work-related and conventional examinations, it is unique. First, the physician completing the examination must be independent with no previous doctor-patient relationship. The IME examiner must arrive at the diagnosis independently of the referring source, personal bias, or outside opinion. The examination involves reviewing relevant medical and insurance records as well as diagnostic studies provided by the participating insurance company; taking a comprehensive history; performing a full physical examination; using appropriate diagnostic studies such as patch testing, laboratory work, biopsies, and cultures; arriving at a diagnosis; writing a report; and, in some instances, attributing causation. An IME report should be readable by the layperson—although the terminology must use legal terms because many cases progress to formal legal proceedings.

The Mathias criteria were published to help determine work-related skin conditions. Four or more positive responses to the following questions yield a greater than 50% probability of an occupational cause of the dermatitis and a reasonable degree of medical certainty.⁷

1. Is the clinical appearance of the dermatitis consistent with an allergic contact dermatitis?
2. Are there workplace exposures to potential cutaneous irritants or allergens?
3. Is the anatomical distribution of the dermatitis consistent with a cutaneous exposure in relation to the worker's tasks?
4. Is there a temporal relationship between the onset of the dermatitis and exposure to the work-related chemical, and is this consistent with the known mechanism of allergic contact dermatitis?
5. Have nonoccupational exposures been excluded as a cause of the dermatitis?
6. Does the dermatitis improve when the worker is away from the suspect allergen or irritant?
7. Does patch testing identify a probable cause of the dermatitis?

Independent medical examination cases can be difficult. The cause of dermatitis is frequently not obvious, and exposures from personal skin care products, hobbies, or second jobs must be taken into consideration. We undertook a review of all IME cases seen in a community dermatology clinic between 2005 and 2014. A retrospective chart review of more than 300 records was done to better understand the demographics, occupations, exposures, clinical presentations, patch test results, dermatologic histories, and risk factors of workers in the Pacific Northwest and to compare our data with existing literature. Many of the initial treating

doctors had diagnosed the worker with an ACD, and all workers believed that they were allergic to something at the workplace. We were interested in determining how many conditions were work related, the incidence of ACD and ICD, previous clinician and office visits, and identifying trends within specific occupations.

MATERIALS AND METHODS

All workers referred for IME to a dermatologist with an interest in occupational skin disease in Portland, Oregon, from 2005 to 2014 were reviewed for inclusion in our analysis. This represents an unknown proportion of total dermatology-related IMEs in Portland. Our inclusion criteria were complete records documenting: history, sex, occupation, anatomic site of dermatitis, physical examination, diagnostic workup, referring diagnoses, final diagnoses, and occupational relevance. There were 43 workers excluded from the study without said criteria. In total, 310 workers had the necessary records available, and all data were collected and entered into a deidentified database. A positive history of atopy included hay fever, asthma, or flexural dermatitis. These data were stored and analyzed in a computerized database. Workers' compensation IME reports are not held to Health Insurance Portability and Accountability Act privacy standards and are considered public record.

The final IME report was derived from a thorough history and physical examination on the day of the initial visit. Before the initial visit, workers filled out a detailed questionnaire aimed to elucidate relevant work and personal contactants. Workers were instructed to bring samples of suspect exposures, including workplace contactants and personal skin care products.

Pertinent medical records, report of investigation interviews, and Material Safety Data Sheets (MSDS) were reviewed before the initial visit and included in the records review section of the final IME report. It is noteworthy that MSDS are of limited utility because most contact allergens are not hazardous and, therefore, rarely listed.⁸ Furthermore, most contact allergens are below the 1% concentration required by the MSDS to be listed.⁹ Known skin irritants are listed on the MSDS, however. If further information regarding a specific product was needed, the manufacturing company was contacted by phone.

Diagnostic workup including biopsy, culture, and laboratory work was performed when indicated. Patch testing was performed in all workers with ACD in their differential diagnosis ($n = 265$). Patch testing is the gold standard used in the diagnosis and evaluation of possible ACD. Patch test allergens were made up of the North American Contact Dermatitis Group standard screen of allergens, which is a screening tray of 70 allergens.¹⁰ The majority of allergens on the tray were held constant from 2005 to 2014, although there were minor additions and subtractions based on new literature reporting changes in allergen exposure and new allergens in skin care products. Concentrations were selected based on North American Contact Dermatitis Group recommendations. Supplemental allergens, specialty trays (machinist tray, hairdresser tray, bakers tray, etc), and samples of workers' workplace and

personal contactants were also tested when indicated. Personal care items such as lotions and creams were tested “as is.” Samples of workplace products and chemicals were tested “as is” as a patch test, based on the irritancy potential of the chemical and the review of the MSDS. Specialty trays were individualized based on the potential work exposure of specific occupations. Soaps and unknown chemicals were not tested. Allergens were purchased from Smart Practice, Dormer, Chemotechnique, and/or Trolab.

Patch testing was carried out to the International Contact Dermatitis Research Group standard.¹¹ Positive patch test reactions were correlated with the workers’ history of exposures to

determine clinical relevance. Clinical relevance was determined at the final patch test reading as present relevance, past relevance, or unknown relevance. The Mathias criteria were used as the basis of the final decision to confirm a work-related skin condition. The report clarified that a positive patch test reaction does not diagnose an allergy.

RESULTS

The retrospective analysis included 310 workers who were evaluated for suspected occupationally related skin diseases between 2005 and 2014. Of the 310 workers, 179 (57.7%) were male, and

Male	179/310 (57.7%)	
Female	131/310 (42.3%)	
History of Atopy (n=296)	141/296 (47.6%)	
Hay fever	107/296 (36.1%)	
Asthma	53/296 (17.9%)	
Flexural eczema	31/296 (10.5%)	
Average history of dermatitis	1.30 years	
Average time spent at occupation	6.24 years	
# of Workers Patch Tested to Rule Out ACD	265 (85.5%)	
Referring Diagnosis	n= (#/310)	
ACD	148 (47.7%)	
Hand Dermatitis	44 (14.2%)	
Eczema	14 (4.5%)	
ICD	12 (3.9%)	
Hand and Arm Dermatitis	9 (2.9%)	
Burn, NOS	9 (2.9%)	
Dyshydrotic Eczema	7 (2.3%)	
Other	65 (21.0%)	
Final Diagnosis	n= (#/310)	# of Diagnoses Deemed Work-Related
ACD	120 (38.7%)	88
ICD	83 (26.8%)	72
concomitant ACD and ICD	13 (4.2%)	11
dermatophytosis	10 (3.2%)	0
psoriasis	9 (2.9%)	0
urticaria	7 (2.3%)	3
frictional hand dermatitis	3 (0.97%)	3
chemical burn	3 (0.97%)	2
folliculitis	3 (0.97%)	0
nummular dermatitis	3 (0.97%)	0
dyshydrotic eczema	2 (0.65%)	0
dermatographism	2 (0.65%)	0
unable to provide diagnosis	19 (6.1%)	0
other diagnosis	33 (10.6%)	6
Total Diagnoses Deemed Work-Related		185 (59.7%)

Figure 1. Profile of workers evaluated.

131 (42.3%) were female (Fig. 1). The mean history of dermatitis was 1.30 years. The worker had worked an average of 6.24 years at the occupation where the dermatitis had developed. Before an IME, the mean number of clinicians seen was 2.27, and the mean number of clinician office visits was 4.22. The most common referring diagnoses were ACD (47.7%), hand dermatitis (14.2%), eczema (4.50%), and ICD (3.90%) (Fig. 1).

Hand dermatitis was the most common presentation: 148 (47.7%). The second most common location of dermatitis was hand and extremity dermatitis (11.6%). Generalized (9.70%), extremity (7.7%), face (4.5%), and eyelid (0.97%) dermatoses were less common (Fig. 2).

The 4 most common diagnoses were ACD ($n = 120$, 38.7%), ICD ($n = 83$, 26.8%), dermatophytosis ($n = 10$, 3.2%), and psoriasis ($n = 9$, 2.9%). For the diagnoses of ACD and ICD, 73.3% ($n = 88$ of 120) and 86.7% ($n = 72$ of 83) were deemed work related, respectively (Fig. 1). Work relatedness was not established for any of the dermatophytosis or psoriasis cases. Other work-related diagnoses included urticaria, frictional hand dermatitis, and chemical burn. Overall, 185 (59.7%) workers were diagnosed with a work-related skin condition (Fig. 1). For 19 (6.10%) of the workers, a final diagnosis could not be provided. A diagnosis of both ACD and ICD was made in 13 (4.2%) workers.

Health care workers made up the largest occupational group seen for IME evaluations ($n = 51$, 16.5%). Custodial staff ($n = 41$, 13.2%), machinists ($n = 36$, 11.6%), food service employees ($n = 21$, 6.8%), auto mechanics ($n = 16$, 5.2%), farm laborers ($n = 13$, 4.2%), and construction workers ($n = 10$, 3.2%) were other high-frequency occupations (Fig. 3). The highest rates of ACD were seen in auto mechanics ($n = 11$ of 16) and machinists ($n = 17$ of 36); 82% and 94% of the ACD diagnoses in auto mechanics and machinists were deemed work related, respectively. Health care workers had the highest frequency of ICD. Of the health care

workers evaluated ($n = 51$), 41% were diagnosed as having a work-related ICD.

Allergens with the highest frequency of positive patch test reactions among the 265 workers patch tested were nickel (58 of 265, 21.8%), thiuram mix (26 of 265, 9.8%), carba mix (22 of 265, 8.3%), neomycin (18 of 265, 6.8%), and balsam of Peru (18 of 265, 6.8%) (Fig. 4). The highest-frequency work-related allergens in those diagnosed as having work-related ACD ($n = 88$) included thiuram mix (21 of 88, 23.9%), carba mix (20 of 88, 22.7%), potassium dichromate (9 of 88, 10.2%), epoxy resin (9 of 88, 10.2%), and chloroxylenol PCMX (5 of 88, 5.7%) (Fig. 5). In health care workers, thiuram mix and carba mix were the highest represented work-related positives. Carba mix was the highest-frequency work-related allergen seen in custodial staff. Potassium dichromate was the highest-frequency work-related allergen seen in machinists and construction workers.

DISCUSSION

Skin diseases are among the most frequently reported occupational illnesses. Contact dermatitis, which includes both ACD and ICD, is the most common occupational skin disorder. The economic burden related to work-related skin injuries exceeds 1 billion dollars in the United States when including indirect costs such as time away from work and decreases in productivity.¹² Making an accurate and timely diagnosis of ACD and/or ICD is essential in relieving this burden on the worker and employer.

In this cohort, ACD (47.5%) was more common than ICD (38.9%) in those diagnosed as having occupational skin disease. The majority of the workers evaluated were afflicted with hand dermatitis. Wet work occupations were highly represented. Patch testing was indicated for more than 85% of the workers seen. The most common work-related positive patch test reactions were to

	n=310
Hand	148 (47.7%)
Hand and extremity	36 (11.6%)
Generalized	30 (9.7%)
Extremity	24 (7.7%)
Hand and other non-extremity location	14 (4.5%)
Face	14 (4.5%)
Eye	3 (0.97%)
Other	41 (13.2%)

Figure 2. Site of dermatitis.

Occupations	n=310	Final Diagnosis of ACD; % Work-Related	Final Diagnosis of ICD; % Work- Related	Most Common Site of Dermatitis	Most Common Work-Related Allergen
Healthcare workers	51 (16.5%)	14; 100%	23; 91.3%	Hands	Thiuram mix
Custodial staff	41 (13.2%)	11; 81.8%	11; 100%	Hands	Carba mix
Machinists	36 (11.6%)	17; 94.1%	8; 100%	Hands	Potassium Dichromate
Food service employees	21 (6.8%)	4; 100%	6; 100%	Hands	Thiuram mix and Carba mix
Auto-Mechanics	16 (5.2%)	11; 81.8%	0	Hands	MCI/ MI
Farm laborers	13 (4.2%)	3; 100%	3; 100%	Hands	Sesquiterpene lactone, Compositae mix
Construction	10 (3.2%)	4; 100%	0	Hands, Extremities, Generalized	Potassium Dichromate
Other	122 (39.3%)				

Figure 3. Highest-frequency occupations with work-related ACD. Only occupations with 10 or more examinees were listed.

Allergen	n=265 patch tested	
	Total Number of Positives	(x/265)
Nickel (2.5%)	58	21.8%
Thiuram (1%)	26	9.8%
Carba (3%)	22	8.3%
Neomycin (20%)	18	6.8%
Balsam of Peru (25%)	18	6.8%
Methyldibromo glutaronitrile (2%)	16	6.0%
Cobalt (1%)	16	6.0%
Formaldehyde (2%)	14	5.3%
Epoxy Resin (1%)	14	5.3%
Gold (0.5%)	14	5.3%
Fragrance Mix (8%)	13	4.9%
Postassium Dichromate (0.25%)	13	4.9%
Quaternium 15 (2%)	11	4.2%
Iodopropynyl Butylcarbamate (0.5%)	9	3.4%
Chloroxylenol PCMX (1%)	9	3.4%
Propylene glycol (30%)	8	3.0%
MCI/MI (0.01%)	8	3.0%
Thimerosal (0.1%)	7	2.6%
Bacitracin (20%)	6	2.3%

Figure 4. Highest-frequency patch test–positive allergens. Only allergens with greater than 5 positives were listed.

Allergen	Work-Related Positives	(x/88)
thiuram mix (1%)	21	23.9%
carba mix (3%)	20	22.7%
potassium dichromate (.25%)	9	10.2%
epoxy resin (1%)	9	10.2%
unable to identify allergen	6	6.8%
chloroxylenol PCMX (1%)	5	5.7%
formaldehyde (2%)	3	3.4%
Quaternium-15 (2%)	3	3.4%
cobalt (1%)	2	2.3%
nickel (2.5%)	2	2.3%
Kroil Oil (as is)	2	2.3%
MCI/MI (0.01%)	2	2.3%
Iodine (0.1%)	1	1.1%
methyl methacrylate (2.0%)	1	1.1%
aluminum shavings (as is)	1	1.1%
Nappa Hand Cleanser (as is)	1	1.1%
Power Cut 511 (as is)	1	1.1%
mercaptobenzothiazole (1.0%)	1	1.1%
sesquiterpene lactone (0.1%)	1	1.1%
hood lining (as is)	1	1.1%
aliphatic Ansell Glove (as is)	1	1.1%
Limonene (2.0%)	1	1.1%
chlorhexidine (1.0%)	1	1.1%
methylisothiazoline (0.2%)	1	1.1%
euxyl K 400 (2.0%)	1	1.1%
thimersol (0.1%)	1	1.1%
SteriSoft Lotion (as is)	1	1.1%
cocamide DEA (0.5%)	1	1.1%
diphenylguanidine (1.0%)	1	1.1%
vinyl gloves (as is)	1	1.1%
Avagard D (as is)	1	1.1%
Premium Gold Engine Coolant (as is)	1	1.1%
poison oak (0.1%)	1	1.1%
colophony (20%)	1	1.1%
Trim Microsol Coolant 585xt (as is)	1	1.1%
Purell Hand Sanitizer (as is)	1	1.1%
Pennzoil Engine Flush (as is)	1	1.1%
dimethyl oxazolidine (1.0%)	1	1.1%
hydroxymethyl propanediol (1.0%)	1	1.1%
SAW coolant AC13942 (as is)	1	1.1%
Pennzoil SAE30 (as is)	1	1.1%
Mixed Oil (as is)	1	1.1%
Permatrex Thread Locker Spray (as is)	1	1.1%
Lanolin (50%)	1	1.1%
methyldibromo glutarolnitirile (2.0%)	1	1.1%
compositae mix (6.0%)	1	1.1%

Figure 5. Frequency of work-related patch test positives.

thiuram mix, carba mix, potassium dichromate, epoxy resin, and chloroxylenol PCMX.

Sex and History of Atopy

The majority of the workers evaluated in our cohort were male, which is representative of current literature. The population of blue collar workers evaluated for occupational contact dermatitis by Schwensen et al¹³ had a higher male-to-female ratio (3.6) than our cohort (1.4). The high proportion of health care workers, of which 92% were female, and the lower proportion of blue collar workers in our cohort can partially explain the lower male-to-female ratio. A study analyzing 1255 health care workers referred for patch testing had a similar proportion of females (86%) as our subset of health care workers.¹⁴ Machinists and auto mechanics, 2 other high-frequency occupations in our cohort, were 94% and 100% male, respectively.

Nearly one half (47.6%) of the workers evaluated had a history of atopy. Hay fever (36.1 %) was most common, which was followed by asthma (17.9%) and flexural dermatitis (10.5%). An atopic diathesis has been implicated as both a risk factor and a prognostic factor for those diagnosed as having occupational skin disease. In a large registry of workers with occupational skin disease (n = 3730), 37% presented with an atopic diathesis, which is nearly 2 times higher than the general population.¹⁵ Furthermore, the prognosis is worse for atopic individuals diagnosed as having occupational skin disease than nonatopic individuals.¹⁶

Site of Dermatitis and Occupations

Roughly one half of the workers presented exclusively with hand dermatitis, followed by concurrent hand and extremity dermatitis. Hand dermatitis is an inflammation of the skin on the hand and can be associated with both ACD and ICD.¹⁷ Hand, generalized, extremity, face, and eyelid dermatoses were less common (Fig. 2). Hand dermatitis was the most common distribution for every occupation, with a sample size of 10 or greater (Fig. 3). The high prevalence of hand dermatitis is well supported in the literature. Retrospective analyses of 1255 health care workers and 1471 blue collar workers showed the hands as the highest frequency site of dermatitis in both studies.^{13,14} In a cross-sectional analysis of 22,025 patients patch tested between 1994 and 2004, 31.6% had hand involvement, with the authors admitting probable underestimation because of coding methods.¹⁸

The most common occupations referred for IME included health care workers, custodial staff, machinists, food service employees, auto mechanics, farm laborers, and construction workers (Fig. 3). These findings are similar to other reports.^{13,19,20} Health care professionals, machinists, and construction workers accounted for roughly one half of the 537 patients evaluated for occupational skin disease in 1 study, with house cleaners, food handlers, and janitors also being common.¹⁹ Another study of 2889 patients suspected of suffering from contact dermatitis identified similar professions at high risk for occupational skin

disease: nurses, assemblers, nurse's aides, machinists, hairdressers, and auto mechanics.²⁰ Machinists, mechanics, painters, and metal-processing workers were the most common professions evaluated for occupational dermatitis in a cohort of blue collar workers.¹³ Blue collar work seems to be a risk factor for the development of ICD and ACD, likely because of employees' exposure to irritants and allergens in their respective labor.

Health Care Workers

Health care workers, the most prevalent occupational group in our review, had higher rates of ICD (45.1%) than ACD (27.4%) (Fig. 3). Frequent hand washing with excess exposure to harsh hand sanitizers was often a causative factor in these cases.²¹ Increased sweating from long periods of wearing gloves was often a contributing feature as well. Donning and removing gloves can also cause shearing and friction of the skin consistent with a physical irritant. All of these factors impair the skin barrier and can predispose the worker to ICD.

In the ACD cases, thiuram and carbamates (rubber accelerators and additives) were the most common work-related positive patch test reactions identified in health care workers in our study. These findings are similar to a review of more than 1200 health care workers.¹⁴ The ubiquitous use of rubber gloves in health care professions increases the risk of developing sensitization to rubber chemicals and should be highly suspect in individuals presenting with pruritic, vesicular, eczematous dermatitis on the dorsal hands and ventral wrists.

Irritant Contact Dermatitis

Irritant contact dermatitis may be more likely when the dermatitis presents on the dorsal hands and web spaces. Wet work is a risk factor for ICD and ACD, with an elevated prevalence in professions requiring wet work.^{22,23} Our data show health care workers, custodial workers, food service employees, and dishwashers with a higher rate of wet work-driven ICD. A study of occupational ICD identified wet work as the most common causative exposure, followed by glove use and then mechanical traumas and oil.⁸ Irritant contact dermatitis was the second most common diagnosis in the workers evaluated in our study, and 86.7% of those diagnoses were deemed work related (Fig 1).

ACD and Patch Test Results

The most common diagnosis in our review was ACD (38.7%), and 73.3% (88 of 120) of those cases were judged to be work related. The occupations with the highest incidence of work-related ACD included machinists, health care workers, custodial staff, and auto mechanics. The most common positive patch test reactions in work-related ACD were thiuram (23.9%), carbamates (22.7%), potassium dichromate (10.2%), epoxy resin (10.2%), chloroxylenol PCMX (5.7%), formaldehyde (3.4%), and quaternium-15 (3.4%) (Fig. 5). A review of 1034 patch test patients included quaternium-15,

formaldehyde, thiuram mix, and carba mix as the most common allergens in occupationally related hand ACD, with greater than 10% positive patch reaction for each.²⁴ In the cohort of 1471 blue collar workers, methylchloroisothiazolinone/methylisothiazolinone, methyldibromo glutaronitrile, epoxy resin, 2-bromo-2-nitro-1,3-propanediol, and potassium dichromate had high rates of occupationally associated ACD.¹³ In a study of 2889 patients referred for contact dermatitis, multiple allergens were strongly associated with occupational exposure, including thiuram, carbamates, epoxy, and ethylenediamine.²⁰ Another study found nickel sulfate, glutaraldehyde, and thiuram mix to be the most common occupationally related allergens in its 537 patients.¹⁹

CONCLUSIONS

Allergic contact dermatitis (47.5%) was more common than ICD (38.9%) in workers found to have an occupationally related skin disease in our cohort of IME referrals. Two large studies of dermatologic patch testing referral centers corroborate these findings: a study of 537 patients found 60% ACD and 34% ICD in patients diagnosed with work-related skin disease.¹⁹ Another study of 2889 patients found ACD (54%) more prevalent than ICD (32%) in a cohort evaluated for occupational contact dermatitis.²⁰ Referral bias, worker awareness, and avoidance of irritant risks at work or first-line providers (industrial hygienists, health nurses, occupational physicians, etc) successfully treating ICD before an IME is warranted could explain the lower rate of ICD in our cohort of IME workers. Irritant contact dermatitis may become severe and chronic, however, with a secondary ACD developing in the setting of a severely impaired skin barrier, which complicates the diagnosis.

The percentage of workers found to have a work-related skin disease (59.7%) was higher than reported in the literature likely because of the nature of our patient population.^{19,20} All workers believed that they had a work-related skin disease, but many did not (40.3%). The majority of the workers referred for an IME were evaluated and treated by multiple physicians before the IME and many by a dermatologist. The IME may be used as a second opinion. A thorough review of the history, complete examination, objective patch testing, biopsy, laboratory work, and the Mathias criteria were used to determine work relatedness. Allergic contact dermatitis and ICD made up the majority of the diagnoses when work was found to be the cause of skin disease.

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