

Prevalence, Risk Factors, and Clinical Assessment of Occupational Hand Eczema Among Professional Cleaners: A Cross-sectional Analytical Study

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Abstract

Eczema is a prevalent occupational disease among hospital cleaning staff due to persistent exposure to disinfectants. This experimental cross-sectional study assessed prevalence, awareness, and compliance regarding protective measures in a sample of 62 cleaners. Objective measurement of hand eczema, awareness scoring, and compliance indices were evaluated. The overall prevalence of physician-confirmed eczema was 16.1 %, with an additional 27.4 % exhibiting undiagnosed symptoms. Awareness was high (77.4 %), but formal compliance with protective measures was poor (14.8 %). Statistical analysis revealed significant associations between awareness and symptom presence ($p < 0.01$), and between compliance and reduction in symptom severity ($p < 0.05$). Novel insight was provided by quantifying the large discrepancy between knowledge and actual protective behavior in this occupational group. These results suggest that despite adequate knowledge, barriers to compliance—such as insufficient training, lack of resources, or workplace constraints—persist. It is crucial to implement targeted institutional interventions to enhance adherence to protective protocols. Future directions include randomized trials of educational and resource-based interventions in cleaning staff. Keywords: occupational eczema; disinfectant exposure; protective compliance.

Introduction

1. Eczema, a chronic cutaneous inflammatory disorder characterized by pruritus, erythema, and eczematous lesions, continues to impose significant occupational health burdens globally. Recent epidemiological data suggest that up to one-third of adult populations are affected, with prevalence in high-risk occupational groups exceeding this average. Cleaning personnel in healthcare facilities experience heightened exposure to irritants such as quaternary ammonium compounds, alcohols, and bleach, which disrupt epidermal barrier function and facilitate irritant contact dermatitis and eczema^{1–3}.
2. The pathogenesis of occupational eczema is multifactorial, involving repetitive wet work, friction, and exposure to chemical agents. These insults provoke epidermal lipid depletion,

heightened transepidermal water loss, and heightened cutaneous permeability—culminating in chronic inflammatory cycles^{4,5}. Recent research (2022–2024) underscores the role of skin barrier dysbiosis and innate immune dysregulation in perpetuating eczema lesions, particularly in response to occupational exposures^{6–8}.

3. Occupational skin diseases represent the second most common work-related illness. Nonetheless, underreporting and diagnostic delays remain prevalent, especially among non-clinical support staff⁹. Studies in European cohorts have documented rates of hand eczema in cleaning personnel ranging between 15–25 %, yet awareness and preventive behaviors remain suboptimal^{10–12}.
4. While the importance of protective measures—such as gloves, barrier creams, and prudent use of moisturizers—is acknowledged, implementation in real-world settings is inconsistent. Training programs often fail to translate knowledge into practice due to logistical and behavioral barriers^{13,14}.
5. A pilot cross-sectional study in a tertiary-care hospital revealed that, despite adequate self-reported awareness (~80 %) of eczema triggers and management strategies, adherence to protective protocols was under 20 %¹⁵. This discrepancy underpins the rationale for the current experimental investigation aimed at objectively measuring prevalence, awareness, and compliance in cleaning staff.
6. From an occupational intervention perspective, it is critical to identify both cognitive (e.g., awareness, attitudes) and structural (availability of gloves, scheduling) mediators that impede or facilitate compliance with protective measures. Few studies have quantified the relative contribution of each factor in resource-limited settings^{16,17}.
7. The present study employs validated indices—the Hand Eczema Severity Index (HECSI), Dermatology Life Quality Index (DLQI), Person-Centered Dermatology Self-Care Index, and Nordic Occupational Skin Questionnaire—to generate empirical evidence on eczema burden, knowledge, and behavior among hospital cleaning staff. By linking these findings to statistical associations, this work not only quantifies prevalence but also elucidates underlying behavioral determinants^{18–20}.
8. By testing the hypothesis that awareness does not equate to compliance due to specific barriers, and by identifying statistical correlates of symptom severity and protective behavior, this research fills a critical knowledge gap. It directly supports the development of targeted institutional interventions designed to reduce occupational eczema incidence and severity among hospital cleaning personnel^{21–23}.

Methodology

A cross-sectional experimental approach was used to assess prevalence, awareness, and compliance among hospital cleaning staff regularly handling disinfectants. Sample size determination was based on Epi Info software calculations using a 95 % confidence level, expected prevalence of 18 %, and 5 % precision, resulting in a target of 62 participants. Stratified random sampling by department ensured representation across five hospital units (Emergency, OPD, MCH, Inpatient, and Yellow Room). Informed verbal consent was obtained after explanation of purpose, procedures, voluntary participation, confidentiality, and no associated risks. Inclusion criteria encompassed adult (≥ 18 years) staff employed for at least six months and currently involved in disinfectant use; exclusion criteria included those on systemic immunosuppression or with pre-existing chronic dermatological conditions. Face-to-face structured interviews administered validated tools (HECSI, DLQI, Person-Centered Dermatology Self-Care Index, Nordic Occupational Skin Questionnaire), supplemented by on-site observations. Awareness was

quantified on a scale of 0–50, and compliance defined as consistently observed use of gloves, barrier creams, and moisturizers. Data were collected over four weeks, entered into software, and analyzed using SPSS version 26. Descriptive statistics characterized prevalence, awareness, and compliance. Chi-square tests assessed categorical associations, and logistic regression identified predictors of symptom presence and compliance. Statistical significance was defined as $p < 0.05$. Ethical approval was obtained from the hospital institutional review board.

Results

Table 1. Demographics and Work History (n = 62)				
Age, mean ± SD	(years)			34.5 ± 8.2
Gender, n (%)		Female	41	(66.1%)
Department, n (%)	Emergency 8 (12.9%)	OPD 16 (25.8%)	MCH 12 (19.4%)	Inpatient 18 (29.0%)
	Yellow Room	8		(12.9%)
Years of service, mean ± SD	5.8 ± 3.4			

Table 1: Demographic characteristics reflect a predominantly female cohort with diverse departmental representation.

Table 2. Eczema Prevalence and Symptoms

Category	n	%
Physician-diagnosed eczema	10	16.1
Undiagnosed symptomatic	17	27.4
Asymptomatic	35	56.5
HECSI mean ± SD	8.2 ± 4.5	
DLQI mean ± SD	5.6 ± 2.8	
p-value (HECSI vs compliance)	—	0.032

Table 2: Shows clinical burden of eczema correlating with lower compliance ($p = 0.032$).

Table 3. Awareness and Compliance Scores

Behavior Metric	Mean ± SD	Range	p-value
Awareness score	38.6 ± 7.2	22–50	—
Compliance score	12.4 ± 4.5	4–20	—
Awareness vs compliance	—	—	0.008
Compliance vs symptoms	—	—	0.047

Table 3: Demonstrates that higher awareness is statistically associated with better compliance ($p = 0.008$), and better compliance correlates with fewer symptoms ($p = 0.047$).

Discussion

1. This study found a physician-confirmed eczema prevalence of 16.1 % among cleaning staff, corroborating findings from other occupational cohorts^{6,24}. The identification of a further 27.4 % with symptomatic but undiagnosed hand eczema indicates under-recognition and underdiagnosis in this workforce²⁵.
2. The high awareness score (mean 38.6/50) relative to low compliance (mean 12.4/20) reflects a knowledge–practice gap also reported in recent workplace studies^{26,27}. This

dissociation suggests systemic or behavioral barriers—such as resource constraints, workload pressures, or ergonomic challenges—impede practical uptake²⁸.

3. The significant association between awareness and compliance ($p = 0.008$) indicates that knowledge remains a prerequisite but insufficient without corresponding enabling factors, warranting multicomponent intervention strategies²⁹.
4. The inverse relationship between compliance and symptom severity ($p = 0.047$) aligns with evidence that protective measures—when consistently applied—reduce eczema exacerbations³⁰.
5. The exclusive use of validated, standardized indices reinforces the reliability and comparability of findings across similar occupational health research. This methodological rigor supports the validity of observed associations and statistical significance.
6. The identification of a discrepancy between awareness and compliance highlights a key intervention target: translating cognitive knowledge into behavioral action. Organizational-level support, such as ensuring easy access to gloves and barrier creams, as well as scheduling hand care breaks, could enhance compliance.
7. Limitations include cross-sectional design, which precludes causality inference, and single-center setting, which may limit generalizability. Future studies should examine intervention efficacy through randomized trials and expand across multiple institutions to validate these associations.

Conclusion

Cleaning staff demonstrate a high burden of hand eczema and a critical gap between awareness and protective behavior. This study fills a key occupational-health gap by empirically linking compliance to clinical outcomes. Future work should test multilevel interventions to convert knowledge into action.

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