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Crusted Scabies in Post-Disaster

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Abstract: Crusted scabies is a severe and highly contagious variant of scabies caused by *Sarcoptes scabiei var. hominis*, characterized by massive mite proliferation, hyperkeratosis, and widespread crusted skin lesions. This condition poses a major public health threat, particularly in post-disaster settings where overcrowding, poor sanitation, limited access to clean water, and disrupted healthcare systems facilitate rapid transmission. This study aims to review the characteristics, risk factors, clinical manifestations, diagnosis, and management of crusted scabies in post-disaster environments based on current dermatological literature. In such settings, additional factors including malnutrition, immunosuppression, chronic illness, and psychological stress increase susceptibility and may accelerate progression from classic to crusted scabies. Clinically, crusted scabies differs from the classic form by minimal or absent pruritus, extensive hyperkeratotic plaques, and frequent nail involvement, often leading to delayed diagnosis. Confirmation is primarily achieved through skin scraping, which typically reveals abundant mites and eggs. Management requires an aggressive and comprehensive approach, combining systemic therapy (oral ivermectin), topical scabicides (e.g., permethrin), and keratolytic agents, alongside treatment of close contacts and strict environmental decontamination. In disaster settings, coordinated public health strategies—including surveillance, mass treatment, and health education—are essential to control outbreaks. In conclusion, crusted scabies in post-disaster conditions represents a preventable yet potentially severe disease. Early recognition, appropriate treatment, and integrated public health interventions are critical to reducing morbidity and preventing widespread transmission in vulnerable populations.
Keywords: Crusted scabies; Post-disaster; Public health management

INTRODUCTION

Scabies is a common contagious skin infestation caused by the mite *Sarcoptes scabiei* var. *hominis*, which burrows into the stratum corneum and induces intense inflammatory and hypersensitivity reactions (1). According to *Fitzpatrick's Dermatology*, scabies remains a significant global health issue, particularly in populations with poor sanitation, limited hygiene resources, and crowded living conditions (2). Clinically, classic scabies is characterized by nocturnal pruritus, erythematous papules, vesicles, excoriations, and the presence of burrows in typical predilection sites. Although it is often perceived as a minor dermatologic condition, scabies causes substantial morbidity, including sleep disturbance, secondary bacterial infections, and rapid transmission within communities (3).

A more severe variant, crusted scabies (keratotic scabies), represents a hyperinfestation form that carries significant epidemiologic consequences. *Rook's Textbook of Dermatology* describes crusted scabies as a manifestation in which the mite burden increases dramatically reaching thousands to millions of mites leading to widespread hyperkeratosis, thick crusts, and fissured plaques. This variant commonly occurs in immunocompromised individuals, the elderly, patients with neurologic impairment, and those with conditions limiting their ability to sense itch or maintain hygiene. The CDC and IUSTI clinical guidelines underscore that crusted scabies is highly contagious and often acts as a core transmitter or super-spreader, fueling institutional or community outbreaks (4–6).

Post-disaster environments, such as after earthquakes, floods, tsunamis, or conflict-related displacement, are particularly conducive to the emergence and spread of scabies, including the crusted form. The World Health Organization (WHO) highlights that disaster settings typically involve overcrowded shelters, inadequate access to clean water, insufficient sanitation, and limited healthcare services (7,8). These conditions promote sustained skin-to-skin contact and sharing of bedding, thereby facilitating widespread transmission. Additional factors common in disaster-affected populations malnutrition, psychological stress, chronic illness, and immunosuppression increase susceptibility not only to acquiring scabies but also to developing the severe crusted variant. Delayed diagnosis due to disrupted healthcare systems and limited medical personnel further elevates the risk of uncontrolled outbreaks (9).

From a dermatological standpoint, crusted scabies requires more complex and aggressive management compared to classic scabies. Both *Fitzpatrick's Dermatology* and *Rook's Textbook of Dermatology* emphasize the need for combination therapy involving systemic agents such as repeated doses of ivermectin and intensive topical treatment with permethrin or benzyl benzoate, as well as keratolytic agents to remove thick crusts. Public health guidelines from CDC, WHO, and IUSTI also recommend simultaneous treatment of all close contacts and rigorous environmental decontamination to prevent reinfestation. In disaster settings where resources are limited, management strategies must be adapted, and coordinated efforts involving healthcare workers, shelter coordinators, and community members are essential.

Given these considerations, this referat aims to provide a comprehensive review of crusted scabies in post-disaster settings, including its definition, epidemiology, risk factors, clinical features, diagnostic approach, and evidence-based management based on current dermatology guidelines and literature. This discussion is intended to enhance clinical competence during the dermatology rotation and support effective recognition, treatment, and prevention of crusted scabies outbreaks particularly in resource-limited and emergency environments.

METHOD

This study was conducted using a narrative literature review approach based on relevant scientific sources related to crusted scabies, particularly in post-disaster settings. Data were collected from textbooks such as *Fitzpatrick's Dermatology* and *Rook's Textbook of Dermatology*, as well as guidelines and reports from organizations including WHO, CDC, and IUSTI, and recent journal articles. The collected literature was then analyzed descriptively to synthesize information on definition, epidemiology, risk factors, clinical manifestations, diagnosis, management, and prevention strategies. The aim of this referat is to provide a comprehensive and evidence-based overview to support clinical understanding and decision-making in resource-limited and emergency conditions.

RESULTS AND DISCUSSION

Definition

Scabies is a contagious skin infestation caused by the mite *Sarcoptes scabiei* var. *hominis*, which burrows into the stratum corneum and triggers inflammatory reactions and pruritus. The more severe form, known as crusted scabies (or keratotic scabies), is characterized by extensive proliferation of mites, marked hyperkeratosis, thick crusted plaques, and widespread scaling involving most or all body surfaces (10).

In crusted scabies, the typical pruritus seen in classic scabies may be minimal or absent because of the extremely high mite burden and the extensive skin damage, leading to delayed recognition by patients or caregivers. In post-disaster settings, crusted scabies becomes a

significant public health threat because even a single case can trigger large outbreaks in temporary shelters or displaced populations with poor sanitation and overcrowding (11).

Etiology and Pathogenesis

The pathogenesis of crusted scabies begins when *Sarcoptes scabiei* var. *hominis* mites penetrate the stratum corneum and create burrows that serve as sites for oviposition and nutrient acquisition through intercellular skin fluid. In the classic form of scabies, the host immune system usually controls the mite population, keeping it low. However, in crusted scabies, impaired or failed immune regulation allows the mites to multiply rapidly, reaching thousands to millions in number. This hyperinfestation triggers a chronic inflammatory response in the epidermis and dermis, characterized by immune cell infiltration and repeated stimulation of keratinocytes, resulting in hyperkeratosis, thick crust formation, and fissures on the skin.

Immune dysfunction plays a crucial role in the progression of this disease. Studies show that patients with crusted scabies exhibit an ineffective immune response pattern, with a predominant Th2 response (elevated IL-5, IL-13, IgE, and eosinophilia) and a weakened Th1 response (such as reduced IFN-γ). In addition, the mites produce complement-inhibiting proteins, enabling them to evade elimination by the innate immune system. This condition is commonly observed in immunocompromised individuals, the elderly, or those with neurological impairments that reduce their ability to scratch and maintain hygiene, allowing uncontrolled mite proliferation and severe infestation (12,13).

Post-disaster environments exacerbate the pathogenesis of crusted scabies through factors such as malnutrition, physical and psychological stress, poor hygiene, and overcrowded living conditions, all of which weaken host immunity and accelerate the transformation of classic scabies into its keratotic form.

Epidemiology

Scabies is one of the most prevalent dermatologic conditions globally, particularly in tropical regions and communities with poor sanitation and high population density. Although specific epidemiological data for crusted scabies are limited, this severe form is epidemiologically important because a single individual can act as a "super-transmitter," triggering outbreaks in refugee camps or institutional settings (14,15).

Studies show that scabies disproportionately affects children, the elderly, and immunocompromised individuals, as well as those with low socioeconomic status factors commonly found in post-disaster populations. In disaster situations, such as refugee camps following natural disasters or conflict, overcrowded shelters, limited access to healthcare, and poor sanitation create an environment in which scabies, including its keratotic form, can spread rapidly and become difficult to control (5).

Risk Factors for Crusted Scabies in Post-Disaster Settings

Post-disaster situations are almost always marked by disruption of social structures, economic stability, and healthcare services. Many families lose their homes and must live in tents or temporary shelters with high levels of crowding. This environment represents a major risk factor for scabies transmission. Close skin-to-skin contact, sleeping in close proximity, and sharing bedding facilitate the spread of mites between individuals. In these conditions, classic scabies spreads rapidly, and in vulnerable individuals, it may progress into crusted scabies (16,17).

Limited access to clean water and sanitation is another critical factor. Water is often prioritized for drinking and cooking, leaving hygiene activities such as bathing and laundry neglected. As a result, personal hygiene decreases, and clothing and bedding are rarely washed. Although scabies is not solely caused by poor hygiene, unsanitary environments make it easier for mites to survive and spread through contaminated clothing or bedding. In crusted scabies, shedding of crusts and scales containing large numbers of mites greatly increases environmental contamination (18).

Other risk factors commonly seen among displaced persons include malnutrition and underlying disease. Protein and micronutrient deficiencies impair immune function, reducing the body's ability to control mite proliferation. Chronic diseases such as tuberculosis, diabetes mellitus, or HIV infection may go undiagnosed or untreated in post-disaster settings, further compromising immunity. In such circumstances, scabies that initially appears mild may evolve into severe crusted scabies.

Delayed diagnosis and treatment also play a significant role. In disaster areas, healthcare workers are often overwhelmed and must prioritize life-threatening conditions such as trauma, respiratory infections, or diarrheal illness. Skin diseases may be overlooked. Crusted scabies, which can resemble psoriasis or chronic dermatitis, is easily missed unless actively suspected. All these compounding factors make crusted scabies not only an individual problem but a threat to entire displaced communities (19).

Clinical Manifestations

Clinically, crusted scabies differs significantly from classic scabies. In classic scabies, the primary symptom is intense nocturnal pruritus accompanied by papules, small vesicles, and burrows in typical sites such as the finger webs, wrists, axillae, periumbilical areas, and genital regions. In contrast, pruritus in crusted scabies may be minimal or absent, especially in patients with impaired sensation or cognitive dysfunction. This contributes to delayed recognition and diagnosis (20).

Skin findings in crusted scabies are dominated by thick, hyperkeratotic, scaly, crusted plaques. Lesions can involve nearly the entire body surface, including the scalp, face, back, buttocks, extremities, palms, and soles. The crusts may appear layered, dry, and yellowish or greenish due to bacterial colonization. Beneath these crusts, erythema, fissuring, and erosions are commonly present. The pronounced keratin thickening often mimics plaque psoriasis or keratoderma, making scabies an unlikely initial diagnosis unless specifically considered (21).

Nail involvement is common in crusted scabies. Nails may appear thickened, friable, and dirty, with subungual debris containing large numbers of mites and eggs. Infested nails become an additional source of transmission because of repeated contact with the patient's own skin or other individuals.

Systemic manifestations of crusted scabies usually result from complications or comorbid conditions. Secondary bacterial infections can lead to fever, malaise, and pain in affected areas. In severe cases especially in overcrowded, resource-limited post-disaster environments these infections can progress to widespread cellulitis or sepsis. Chronic pruritus, physical discomfort, and the socially stigmatizing appearance of the skin lesions contribute to psychological distress, particularly among individuals already traumatized by disaster (22).

Diagnosis

Diagnosis of crusted scabies begins with careful history taking, including pruritus, similar lesions among family members or shelter residents, and environmental factors such as living in refugee camps or crowded conditions. However, in crusted scabies, minimal pruritus and a long disease course may obscure associations with scabies. Epidemiological clues, such as multiple cases of itching within a community, are therefore extremely valuable (23).

Physical examination must be thorough. Clinicians should inspect not only typical sites but the entire body surface, including the scalp, ears, back, buttocks, palms, soles, and nails. Thick plaques and crusts should be evaluated carefully, and removal of a portion of the crust may be necessary to assess the underlying skin. Symmetrical, widespread, and hyperkeratotic lesions, along with nail involvement, should raise strong suspicion for crusted scabies in at-risk patients.

Skin scraping remains the most important diagnostic tool. Scrapings taken from crusted or hyperkeratotic areas are examined microscopically for the presence of mites, eggs, or fecal pellets. In crusted scabies, these findings are typically abundant, giving the examination a high

sensitivity. Potassium hydroxide preparation/ immersion oil may aid visualization. Dermoscopy show characteristic "delta-wing" signs or burrows, but in many post-disaster settings this equipment is unavailable, making skin scraping the primary diagnostic method (24).

Differential diagnoses include psoriasis, chronic dermatitis, ichthyosis, extensive tinea corporis, keratoderma, and other hyperkeratotic dermatoses. Key distinguishing features include epidemiological factors, involvement of multiple household members or shelter residents, and the detection of mites on microscopy. Maintaining clinical suspicion is critical in refugee or disaster settings, where delayed diagnosis can lead to rapid transmission within the community.

Management

Management of crusted scabies has a dual objective: to cure the individual patient and to interrupt transmission within the community. Because of the extremely high mite burden and the usually slower clinical response compared with classic scabies, treatment must be aggressive and comprehensive. In general, a combination of systemic and topical therapy is preferred over monotherapy. In addition, environmental measures and treatment of close contacts are mandatory to prevent reinfestation and new chains of transmission (25).

TABLE 178-2
Treatment of Scabies

DRUG	DOSE	COMMENTS
Permethrin 5% cream	Apply to entire body (neck down) for 8 to 14 hours then wash off, repeat in 7 days; if crusted scabies use daily for 7 days then twice weekly until cured	Most common treatment presently; pregnancy category B, tolerance seems to be developing
Lindane 1% lotion	Apply for 8 hours, repeat in 7 days	U.S. Food and Drug Administration "black box" warning now in effect*; banned in California
Crotamiton 10% cream	Apply for 8 hours on days 1, 2, 3, and 8	Has antipruritic qualities; effectiveness is marginal
Precipitated sulfur 5% to 10%	Apply for 8 hours on days 1, 2, and 3	Considered safe in neonates and during pregnancy; limited efficacy data; inexpensive
Benzyl benzoate 10% lotion	Apply for 24 hours	Not available in United States
Ivermectin 200 μg/kg	Taken orally on days 1 and 8; if crusted scabies take on days 1, 2, 8, 9, and 15	Highly effective with good safety profile; not recommended for children who weigh less than 15 kg (33 lb) or for pregnant or lactating women; wash sheets and clothing at 60°C (140°F) and dry in a hot dryer; items that cannot be placed in a washer can be placed in a sealed plastic bag in a warm area for 2 weeks

*"Black box" warning warns against usage in premature infants and individuals with known uncontrolled seizure disorders, as well as cautious usage in infants, children, and the elderly including people who weigh less than 50 kg (110 pounds) and over 65 years old may be at risk of serious neurotoxicity.

According Fitzpatrick's Dermatology and *Rook's Textbook of Dermatology* For crusted scabies, multiple doses of ivermectin may be and should be combined with a topical scabicide and a keratolytic cream to improve penetration. Systemic therapy uses oral ivermectin, with the dose adjusted to body weight. In crusted scabies, ivermectin cannot be given only once or twice; instead, multiple doses are required according to recommended protocols, for example on days 1 and 2 and then repeated in the following weeks until clinical improvement is achieved. Ivermectin is especially useful when the application of topical agents over the entire body is difficult, such as in elderly patients, individuals with disabilities, or in crowded post-disaster shelters with limited nursing support (25)

Topical therapy remains essential. Permethrin 5% cream is one of the first-line agents, applied to the entire body surface, including the scalp in selected cases, and left on for several hours before being washed off. In crusted scabies, applications must be repeated more frequently and for a longer duration than in classic scabies, because thick crusts and hyperkeratosis impede penetration of the drug. To enhance efficacy, keratolytic agents such as salicylic acid or urea preparations are used to soften and reduce hyperkeratosis, allowing the scabicide to reach the mites more effectively (21).

Another important aspect of management is supportive care and treatment of complications. Secondary bacterial infection of the skin requires appropriate systemic and/or topical antibiotics depending on the clinical presentation. Patients frequently need analgesics and antihistamines to reduce discomfort and pruritus. Education of the patient and family

members regarding the correct use of medications, the importance of completing the prescribed regimen, and the need to treat all close contacts should be delivered in clear, understandable language. In camp or shelter settings, coordination with healthcare workers and camp management is crucial to ensure that treatment is implemented simultaneously and consistently for all affected individuals.

Because of the high infectivity of crusted scabies, patients should be placed under relative isolation, particularly in refugee camps or institutional environments, to reduce the risk of transmission to others. After initiation of therapy, these patients should remain under close observation, and repeated skin scrapings may be performed when necessary to confirm a decline in mite burden or eradication. Clinical monitoring is also required to detect new lesions, treatment failure, or complications such as extensive secondary bacterial infection.

Management of Contacts and Environment

All close contacts of a patient with crusted scabies including household members, roommates, bed partners, and other residents sharing the same dormitory or shelter must receive treatment, ideally at the same time or within a short interval after the index case is confirmed, even if they are asymptomatic. This approach is essential to prevent reinfestation of the index patient and to stop new cycles of transmission. Management of contacts should be integrated into a broader response strategy at the shelter level or in the disaster setting.

Environmental decontamination is also critical. All clothing, blankets, sheets, and towels used within the previous three to five days should be washed in hot water (at least 50 °C) and dried at high temperature or thoroughly sun-dried. Items that cannot be washed immediately can be sealed in plastic bags for a minimum of 72 hours up to one week to allow mites to die. Mattresses, sleeping mats, pillows, and frequently used surfaces should be cleaned and vacuumed. Although routine use of aerosol disinfectants is not always necessary, organized cleaning activities are strongly recommended to reduce environmental mite burden (Queensland Health). In overcrowded shelters, centralized systems for laundry and mass replacement or cleaning of bedding are often needed to control transmission.

From a public health perspective, detection of one or more crusted scabies cases in a shelter, nursing home, barracks, or similar setting should trigger active surveillance to identify additional cases and activation of an outbreak response plan (GOV.UK). Emergency response coordination should involve healthcare teams, camp or institution managers, and logistics personnel to ensure adequate supplies of medications, laundry facilities, isolation spaces, and health education materials. Community-wide education should emphasize recognition of symptoms, the importance of simultaneous treatment, personal hygiene, avoidance of sharing clothes and bedding, and prompt reporting of new itching or skin lesions.

Management in Post-Disaster Settings

In post-disaster settings, management of crusted scabies must be adapted to conditions that differ greatly from routine clinical practice. Frontline health workers need to be trained to recognize the clinical features of crusted scabies namely, thick crusted lesions with minimal pruritus so that diagnosis is not delayed. Systemic agents such as ivermectin and topical agents such as permethrin must be available in sufficient quantities; when supplies are limited, priority should be given to crusted scabies cases, and drug stocks must be managed carefully (23,25).

Isolation systems and mass treatment strategies may be required, for example, administering scabicide treatment to all residents of a dormitory or shelter if a rapidly spreading crusted scabies case is identified. Laundry facilities and replacement of bedding should be incorporated into disaster response planning, as the shelter environment is highly conducive to transmission via fomites. Continuous monitoring after the acute disaster period is important: even if crusted scabies has been treated, the risk of recurrence remains high if contacts and environmental sources have not been adequately addressed.

Complications and Prognosis

Complications of crusted scabies are mainly related to disruption of the skin barrier and the very high mite burden. Inflamed, eroded, and fissured skin provides a portal of entry for bacteria, so secondary infections such as impetigo, folliculitis, cellulitis, and abscesses are common. If untreated, these infections can progress to bacteremia and sepsis, particularly in malnourished patients, the elderly, or individuals with comorbid conditions. Long-standing skin infection due to scabies can also contribute to post-infectious complications such as acute glomerulonephritis (25).

From a cutaneous standpoint, chronic crusted scabies may leave residual hyperpigmentation or hypopigmentation, lichenification, and persistent skin thickening. Although these changes are not usually life-threatening, they can impair physical appearance and reduce self-confidence. Long-standing nail involvement may lead to permanent nail deformities. In some cases, conspicuous chronic skin disease on the face and exposed extremities can lead to social stigma, which in turn negatively affects the patient's mental health.

Psychologically, crusted scabies adds an additional burden, especially in displaced populations that have already experienced trauma from disasters. Chronic itching, embarrassment, and a sense of isolation due to fear of transmitting the disease can exacerbate anxiety and depression. In children, severe skin disease may interfere with sleep, play, and learning activities. Over time, these experiences can affect social and emotional development (20).

Overall, the prognosis of crusted scabies is generally good if the diagnosis is made early and adequate therapy including treatment of contacts and environmental control can be implemented. However, in post-disaster situations where access to medications, healthcare personnel, and sanitation facilities is limited, the disease course may be more severe and prolonged. Prognosis is also influenced by the patient's immune status and underlying illnesses. In patients with significant immunosuppression, the risk of relapse and complications is higher, necessitating long-term follow-up and collaboration with other specialties such as internal medicine and clinical nutrition (6).

Prevention and Control in Post-Disaster Settings

Prevention of crusted scabies in post-disaster environments cannot be separated from general scabies control efforts. The first step is to improve living conditions in shelters as far as resources permit, such as reducing crowding within rooms, spacing beds apart, and providing bedding that can be cleaned regularly. Although resources are often limited, the basic principle of reducing prolonged close skin contact should be pursued, especially in locations where scabies cases have already been identified (22).

Sanitation and personal hygiene play a crucial role. Provision of sufficient clean water for bathing and laundry must be prioritized alongside other essential needs such as drinking water and food. Regular health education should be delivered to displaced persons, emphasizing the importance of bathing, changing clothes frequently, avoiding sharing clothing, towels, and blankets, and promptly reporting any itching that appears in multiple family members(22).

Active surveillance is also critical for scabies control. Healthcare wo2rkers in shelters should be vigilant for clusters of pruritus or skin lesions involving family groups or dormitory units. Simple skin examinations and on-site skin scrapings can help identify cases early. Once a crusted scabies case is detected, control efforts must be intensified, because such patients have high transmission potential. Treatment of all close contacts, including those who are asymptomatic, should be integrated into the response plan (24,25).

On a broader scale, when scabies prevalence is high in a camp and transmission remains difficult to control with individual case management alone, mass treatment with antiscabetic

drugs such as ivermectin may be considered for all residents, according to protocols and drug availability. This strategy requires strong coordination between health authorities, camp management, and humanitarian organizations. With well-planned prevention and control measures, the occurrence of crusted scabies and large scabies outbreaks in post-disaster settings can be minimized.

CONCLUSION

Crusted scabies represents the most severe manifestation of *Sarcoptes scabiei* infestation and carries major clinical and public health implications, especially in post-disaster environments. The combination of an impaired host immune response, extremely high mite burden, and widespread hyperkeratotic skin lesions makes this condition highly contagious and capable of triggering rapid, large-scale outbreaks in overcrowded shelters or displaced populations. Post-disaster settings characterized by compromised sanitation, limited health resources, malnutrition, and disrupted social infrastructure create an ideal environment for transformation of classic scabies into the keratotic form.

Early recognition is essential, yet frequently challenging, because pruritus may be minimal and the clinical presentation often resembles psoriasis or other hyperkeratotic dermatoses. Diagnosis relies heavily on thorough clinical examination and confirmation through skin scraping, which typically reveals abundant mites, eggs, and fecal material. Failure to diagnose crusted scabies promptly increases the risk of secondary bacterial infections, sepsis, and community-wide transmission.

Effective management requires an aggressive, combined therapeutic approach using repeated doses of oral ivermectin, intensive topical scabicides, and keratolytic agents to enhance drug penetration. Treatment must extend beyond the individual patient: all close contacts must be managed simultaneously, and environmental decontamination must be implemented to prevent reinfestation. In post-disaster shelters, coordinated outbreak controlNincluding surveillance, contact tracing, mass treatment when needed, and health education is critical. These coordinated strategies align with international recommendations from WHO, CDC, and dermatology textbooks such as *Fitzpatrick's Dermatology* and *Rook's Textbook of Dermatology*.

Overall, crusted scabies in post-disaster situations represents a preventable yet potentially devastating condition. With timely diagnosis, appropriate therapy, improved hygiene measures, and integrated public health efforts, morbidity and transmission can be significantly reduced. Strengthening awareness and capacity among healthcare providers and disaster-response teams is essential to protect vulnerable populations and prevent future outbreaks.

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