

Systematic Review

Skin Rashes in Emergency Department Visits, Clinical Features, Differential Diagnoses, and Admission Rates: A Systematic Review

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Abstract

Objective: To systematically review the epidemiology, clinical features, differential diagnoses, and outcomes of dermatological conditions presenting to emergency departments. **Methods:** A systematic review was conducted according to PRISMA guidelines. PubMed, Scopus, Web of Science, and Google Scholar were searched for studies published between 2011 and 2024. Eligible observational studies reporting on dermatological presentations in emergency departments were included. Data extraction and quality assessment were performed using the Newcastle–Ottawa Scale, and results were synthesized narratively. **Results:** Ten studies from the United States, Turkey, Saudi Arabia, and Germany were included, with sample sizes ranging from 204 to over 11,000 patients. Infections, urticaria, eczema, and drug eruptions were the most common presentations. Stevens–Johnson syndrome, toxic epidermal necrolysis, and severe drug reactions accounted for most admissions. Over 90% of patients were discharged without hospitalization. Admission rates ranged from 6% to 18%. Seasonal variation was observed in Saudi Arabia, while the COVID-19 pandemic shifted consultation patterns in Turkey. Teledermatology show effectiveness in diagnostic support, particularly in resource-limited settings. **Conclusion:** Most dermatological emergency department visits are non-urgent and can be managed on an outpatient basis. Early recognition of severity markers is essential to prevent adverse outcomes. Integration of standardized triage systems, physician training, and teledermatology can improve diagnostic accuracy, reduce inappropriate ED utilization, and optimize patient management.

Keywords

Emergency department; Dermatological emergencies; Skin rashes; Differential diagnosis

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Introduction

Dermatological complaints constitute a large proportion of emergency department (ED) visits, estimated at 4–12% globally [1]. Dermatology is often regarded as an outpatient specialty, but the acute onset of skin symptoms, rashes, urticaria, or drug eruptions, leads patients to seek urgent care [2]. The spectrum of dermatological emergencies is broad, range from benign self-limiting eruptions to severe, life-threatening conditions such as Stevens–Johnson syndrome (SJS), toxic epidermal necrolysis (TEN), and severe cutaneous drug reactions [3]. Distinguishing these entities in time-constrained ED environments remains a diagnostic and management challenge [2].

Epidemiological studies from different regions indicate the variations of dermatological presentations. In Morocco, a two-year case series reported that infectious dermatoses, mainly erysipelas, were the leading cause of emergency consultations, followed by drug-induced reactions and autoimmune bullous diseases [4]. A Turkish cross-sectional study identified urticaria and drug eruptions as the most common ED presentations, with the majority of patients discharged after short-term management [1]. European studies show eczema, scabies, and other non-urgent conditions dominating dermatological ED consultations, raising concerns about inappropriate utilization of emergency services [2,5]. Infections, inflammatory dermatoses, and mucocutaneous manifestations of systemic diseases mimic each other, which complicate timely diagnosis. Viral and bacterial infections (herpesvirus, varicella, Epstein–Barr virus, and meningococemia) present with enanthems or exanthems that are easily misinterpreted, underscoring the importance of rapid recognition and intervention. Globalization and emerging infections, observed during the

COVID-19 pandemic, further diversify the clinical spectrum of ED dermatology [6].

Recent systematic reviews show the need for accurate triage and diagnostic support. In-person dermatology consultations achieve high diagnostic accuracy, while teledermatology offers a reliable adjunct, especially in resource-limited or overcrowded settings [3]. Hospitalization rates is low (4–8%) in most studies, and patients requiring admission often present with severe drug reactions, vasculitis, or autoimmune blistering diseases that carry significant morbidity and mortality risks [3]. In this review we aimed to highlight clinical patterns, epidemiological differences, and management strategies that guide emergency physicians in differentiating benign rashes from critical dermatological emergencies [3].

Methodology

This systematic review was according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Fig 1). The primary objective was to discuss the available original articles on the epidemiology, demographic characteristics, clinical features, and outcomes of dermatological conditions presenting to emergency departments.

A literature search was done using electronic databases (PubMed, Scopus, Web of Science, and Google Scholar). The search covered all articles published from 2011 to 2024. A combination of Medical Subject Headings (MeSH) and free-text terms was applied, (dermatology emergencies, emergency department, cutaneous conditions, skin diseases and emergency, and dermatological consultations). To ensure completeness, the reference lists of relevant articles were also manually screened for additional eligible studies.

Studies were considered eligible if they reported original data on dermatological conditions presenting to the emergency department, included epidemiological or clinical information demographic features, diagnoses, or outcomes, and were published in English. Observational designs, retrospective, prospective, and cross-sectional studies were included, while case reports, review articles, conference abstracts, and studies focusing exclusively on trauma or burn injuries were excluded.

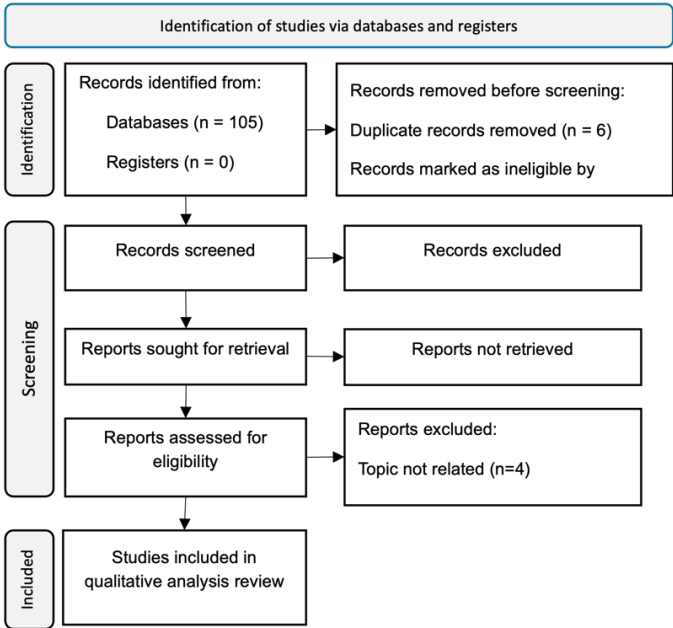


Fig 1: PRISMA consort chart of study selection

Full texts of suitable articles were retrieved and assessed against the predefined inclusion criteria. Disagreements were resolved through discussion and consensus with a third reviewer. Following this process, a total of ten studies met the criteria and were included in the final analysis. These studies originated from diverse geographical regions including the United States, Turkey, Saudi Arabia, and Germany, offering a broad perspective on dermatological emergencies in different healthcare systems.

Data were extracted using a standardized form that captured citation details, study design, sample size, demographic information, presenting features, duration of symptoms, associated systemic signs, common

dermatological diagnoses, treatment strategies, and patient outcomes. Two reviewers extracted and checked the data. The quality of the included studies was assessed using the Newcastle–Ottawa Scale (NOS), which evaluates methodological rigor in terms of study selection, comparability, and outcome assessment. The findings were synthesized narratively, and results summarized across the domains of demographics, clinical presentation, diagnosis, management, and outcomes. Where available, numerical values, percentages and case counts were included to highlight patterns and strengthen comparisons in studies.

Results

Ten studies published between 2011 and 2024 were included in this systematic review (Table 1), representing data from the United States, Turkey, Saudi Arabia, and Germany. The studies were mainly retrospective chart reviews, one was a prospective single-center survey and another a comparative evaluation of pre- and post-COVID-19 dermatology consultations. Sample sizes ranged from 204 patients in a tertiary U.S. hospital study to over 11,000 cases reported in a large Saudi Arabian center. These studies provide overview of dermatological conditions encountered in emergency departments in different healthcare systems.

The demographic profiles of patients differed according to study location and setting. While most cohorts reported an almost equal sex distribution, age ranges were highly variable. Pediatric populations formed the majority in the studies from Saudi Arabia, with AlKhater et al. [7] identifying more than 2,000 pediatric cases in a single year and Alshibani et al. [8] reporting that more than half of their large cohort were younger than 18 years. Adult populations were predominant in Turkish and German studies, where the mean age was typically in the early to mid-forties. Bin Rubaian et al. [9] reported a

median age of 12 years, underscoring the prominence of childhood presentations in the Saudi setting, while Özkur et al. [10] and Temel et al. [11] found middle-aged adults to be the largest subgroup in dermatology consultations in Turkey.

Duration and clinical characteristics of the presenting dermatological complaints were reported but revealed some important patterns. Jack et al. [12] show that acute eruptions of less than one month’s duration were associated with hospital admission, in cases of severe cutaneous drug reactions and Stevens–Johnson syndrome. Ansorge et al. [2] noted that many patients in Germany presented with symptoms lasting more than a week, most commonly pruritus and rash, which often prompted self-referral despite the non-urgent nature of disease. Pain, blistering, mucosal involvement, and widespread eruptions were highlighted as markers of severe disease requiring inpatient management.

The spectrum of diagnoses differ but shared several recurrent findings. Infections and inflammatory dermatoses emerged as the dominant categories. National U.S. estimates by Kody et al. [13] revealed cellulitis and cutaneous abscesses to be the most frequent causes of ED visits, while Özkur et al. [10] found infections to account for almost 87% of consultations in a Turkish tertiary center. Alshibani et al. [8] described cellulitis in 13.6% of over 11,000 Saudi cases. Inflammatory and allergic disorders were also common, with urticaria and

eczema featuring prominently. Kilic et al. [1] reported urticaria and drug eruptions in more than 80% of cases in Turkey, while AlKhater et al. [7] identified atopic dermatitis and urticaria as the leading pediatric dermatological emergencies. Severe, life-threatening conditions were noted in multiple studies as the leading causes of admission, mainly Stevens–Johnson syndrome, toxic epidermal necrolysis, and pemphigus vulgaris.

Most cases were classified as non-urgent and discharged from the ED, with discharge rates exceeding 90% in several cohorts. Hospitalization was uncommon, ranging between 6% and 18%, and was largely confined to patients with severe cutaneous adverse reactions, extensive infections, or immunobullous diseases. Bin Rubaian et al. [9] show that the majority of their cases can be adequately managed in primary care rather than the ED, while Hines et al. [14] show the significant impact of dermatology consultation in altering diagnosis and treatment, whether delivered in person or via teledermatology.

Seasonal variation was evident in Saudi Arabia, with Bin Rubaian et al. [9] observing peaks in dermatological emergencies during winter and autumn. The COVID-19 pandemic altered consultation profiles, with Temel et al. [11] showing an increased incidence of vasculitis, pruritus, and infectious conditions and impetigo during the pandemic compared to the pre-pandemic era (Table 2).

Table 1: characteristics of included studies

Citation	Study Design	Sample Size	Country	Study Aim	Outcomes
Kody et al., 2020 [8]	Cross-sectional using national database (2008–2017)	National estimates of ED visits	USA	To evaluate trends and diagnoses in dermatology-related ED visits	Dermatologic visits accounted for 3.5–4.3% of ED cases; cellulitis and abscess most common diagnoses
Özkur et al., 2020 [4]	Retrospective chart review (2017–2018)	444 patients	Turkey	To investigate profile of ED dermatology consultations	Skin infections (86.9%) most common; peak cases in April ; urticaria/angioedema also frequent

Bin Rubaian et al., 2024 [3]	Retrospective chart review (2021–2023)	301 patients	Saudi Arabia	To describe epidemiology and patterns of dermatology-related ED cases	Maculopapular rashes most common (35.6%); majority triaged as non-urgent; seasonal variations observed
Jack et al., 2011 [6]	Retrospective chart review (2004–2007)	204 patients	USA	To identify common cutaneous diseases leading to dermatology consultation and admission	18% admitted; Stevens–Johnson syndrome, pemphigus vulgaris, severe drug eruptions frequent in admitted cases
AlKhater et al., 2017 [1]	Retrospective study (2014)	2070 pediatric ER cases out of 44,162	Saudi Arabia	To assess prevalence and pattern of pediatric dermatological emergencies	Atopic dermatitis (10.8%) and urticaria (9.7%) most common; 25.2% infectious diseases; 10.5% undiagnosed
Temel et al., 2023 [5]	Comparative evaluation (2019–2021)	639 consultations	Turkey	To compare dermatology ED consultations pre- and during COVID-19	Herpes zoster, urticaria, dermatitis most common; increase in vasculitis and pruritus during pandemic
Kilic et al., 2019 [9]	Retrospective cross-sectional	859 patients	Turkey	To describe epidemiology of dermatology-related ED visits	Most common diagnosis: urticaria and drug eruptions (84.5%); 93.6% discharged; few emergent cases
Ansorge et al., 2018 [7]	Prospective single-center survey (6 months)	1552 consultations	Germany	To analyze demographics, diagnoses, and hospitalization rates	Eczema, urticaria, scabies most common; 8% hospitalization; many cases were non-urgent
Alshibani et al., 2024 [2]	Retrospective cohort (2022–2023)	11,443 patients	Saudi Arabia	To investigate dermatology-related ED encounters in Riyadh	Rash/unspecified eruptions (16%), cellulitis (13.6%), urticaria (12.2%); majority in children <18 years
Hines et al., 2021 [10]	Retrospective chart review (2015–2019)	450 consultations	USA	To analyze ED dermatology consultations comparing in-person and teledermatology	Dermatitis (24.7%), infections (20.4%), drug reactions (10.3%) most common; teledermatology effective, but in-person linked with more admissions

Table 2: demographics and clinical findings of dermatology ed studies

Citation	Demographics	Duration of Rash	Associated Symptoms	Most Common Diagnosis	Main Findings
Kody et al., 2020 [8]	National US ED sample; all ages	Not specified	Not detailed; focus on cellulitis/abscess	Cellulitis, cutaneous abscess	Dermatology-related visits 3.5–4.3% of ED; infections most frequent
Özkur et al., 2020 [4]	Mean age 44.6 years; 56% male	Varied; peak in April	Not specified in detail	Skin infections (86.9%)	Infections dominated; viral most common; urticaria/angioedema also seen
Bin Rubaian et al., 2024 [3]	Median age 12 years; 50% male/female	Median visit duration 312 minutes	Not detailed; triage data available	Maculopapular rash (35.6%)	Majority non-urgent; seasonal variation; topical steroids, antihistamines used

Jack et al., 2011 [6]	204 patients, adult ED, urban US	Acute (< 1 month) more common in admitted cases	Pain, blistering, mucosal involvement in severe cases	Eczematous dermatitis, scabies, drug eruption	18% admitted; severe drug eruptions, SJS, pemphigus vulgaris most serious
AlKhater et al., 2017 [1]	2070 pediatric ER cases (≤13 years)	Not reported	Not specified	Atopic dermatitis (10.8%) , urticaria (9.7%)	High frequency of infectious (25.2%) and allergic dermatoses; 10.5% undiagnosed
Temel et al., 2023 [5]	639 consultations, mean age 44–46 yrs	Not specified	COVID-19 related eruptions noted	Herpes zoster, urticaria, dermatitis	Pandemic shifted profiles; increased vasculitis, pruritus, impetigo/folliculitis
Kilic et al., 2019 [9]	859 patients; mean age 39 yrs; 59.5% female	Not detailed	Pruritus, allergic reactions	Urticaria, drug eruptions (84.5%)	Most patients discharged; only 6.4% hospitalized; few emergent cases
Ansorge et al., 2018 [7]	1552 consultations; mean age 41 yrs; 53% female	>1 week on average	Itching, rash most frequent complaints	Eczema, urticaria, scabies	8% hospitalized; many non-urgent diagnoses; 72% self-referrals
Alshibani et al., 2024 [2]	11,443 patients; mean age 22.4 yrs; 54.9% male; 55% <18 yrs	Not specified	Varied; systemic data not detailed	Rash/unspecified eruption (16%), cellulitis (13.6%), urticaria (12.2%)	Children formed majority; wide range of dermatology emergencies
Hines et al., 2021 [10]	450 consultations; mix of adults/peds at Mayo Clinic	Varied; acute vs chronic compared	Severe cases: blistering, systemic illness	Dermatitis (24.7%), infection (20.4%), drug reaction (10.3%)	Teledermatology effective; in-person linked with higher admission and diagnostic changes

ED, Emergency Department; SJS, Stevens–Johnson Syndrome; TEN, Toxic Epidermal Necrolysis; NOS, Newcastle–Ottawa Scale; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; COVID-19, Coronavirus Disease 2019; MeSH, Medical Subject Headings

Discussion

Dermatological conditions represent a considerable proportion of ED visits. The spectrum of presentations and outcomes differ in regions and healthcare systems. The present review, consistent with prior analyses, shows that most cases are benign or non-urgent, although a subset herald severe or life-threatening disorders. Several recent systematic reviews show that rashes are the most frequent ED dermatology presentations, the key challenge lies in distinguishing innocuous eruptions from early manifestations of severe drug reactions, autoimmune bullous disorders, or infections that can rapidly progress without timely intervention [11].

Regional studies found significant epidemiological diversity. In Morocco, a two-year case series reported infectious dermatoses, mainly erysipelas, as the leading

cause of dermatological emergencies, followed by drug eruptions and autoimmune bullous diseases [12]. Australian studies show a predominance of cellulitis and abscesses, with the majority of patients discharged directly from the ED, underscoring that only a small proportion required inpatient care [13,14]. Data from Switzerland confirmed that infections and eczema were the most frequent ED diagnoses, and many visits were deemed unjustified, pointing to inappropriate utilization of emergency services [15].

Clinical severity markers have been identified in studies. In a U.S. cohort, admitted patients had acute eruptions of less than one month's duration, with features including pain, blistering, mucosal involvement, and systemic illness, which strongly predicted hospitalization [6]. These findings align with broader reviews noting that Stevens–Johnson syndrome, toxic

epidermal necrolysis, and pemphigus vulgaris is the main dermatological emergencies requiring admission and carry the highest morbidity and mortality risks [11].

Viral and bacterial infections are central to ED dermatology, with emerging infectious diseases and globalization introducing novel clinical challenges [16]. The growing role of teledermatology, though slightly less accurate than in-person consultations, offers a promising adjunct to improve access and diagnostic support in overstretched EDs [11].

These findings indicate the need for standardized triage pathways, improved dermatology training for emergency physicians, and public health initiatives to reduce inappropriate ED utilization. Early recognition of high-risk features, integration of telemedicine, and context-specific strategies tailored to regional epidemiology improve outcomes and optimize resource use in dermatological emergencies.

Conclusion

Dermatological conditions represent a notable proportion of emergency department visits,

though most are non-urgent and managed on an outpatient basis. Infections, urticaria, eczema, and drug eruptions are frequent, while Stevens–Johnson syndrome and toxic epidermal necrolysis account for most admissions. Early recognition of clinical severity markers is important to avoid adverse outcomes. Standardized triage systems, physician training, and teledermatology integration improve diagnostic accuracy, reduce unnecessary ED utilization, and optimize management of dermatological emergencies.

Ethical & Transparency Statements

Ethical Approval: This systematic review did not involve human or animal subjects; therefore, ethical approval was not required.

Conflict of Interest: The authors declare no conflicts of interest.

Funding: None.

Data Availability: All data generated or analyzed during this study are included in this published article.

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