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Systematic review

Emergency Department Initiated Versus Trauma Team Initiated Massive Transfusion Protocols After Injury: A Review of Activation, Time to Transfusion, and Clinical Outcomes

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10/11/2026

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Abstract

Background. Atopic dermatitis, psoriasis, scabies, and tinea share clinical features and require different treatment. We examined how often diagnoses made by primary care and emergency physicians agreed with dermatologist assessments and which conditions accounted for disagreement. Methods. We reviewed original comparative studies published through 31 May 2026. We extracted disease-specific sensitivity, positive predictive value, agreement, and documented diagnostic errors. Differences in patient selection, denominators, and reference assessments supported narrative synthesis. Results. We included twelve original studies. In a Spanish referral cohort, sensitivity was 85% for atopic dermatitis, 88.8% for psoriasis, and 25% for scabies. In North Indian primary care, the physician recognized two of fourteen dermatologist-diagnosed psoriasis cases and sixteen of eighteen scabies cases. Eleven eczema cases received a scabies diagnosis. In Bahrain, clinicians agreed on six of eight psoriasis cases, ten of fourteen scabies cases, and two of six tinea cases. Maritime physicians recognized two of twelve dermatologist-diagnosed tinea cases. French pediatricians agreed with a dermatologist on 73% of atopic dermatitis diagnoses across emergency and community settings. Emergency studies generally reported agreement across mixed skin disorders. Conclusion. Diagnostic performance varied between conditions and clinical settings. Scabies was both missed and overdiagnosed, while psoriasis recognition differed markedly between cohorts. Tinea estimates were based on small samples.

Keywords: Diagnostic accuracy, primary health care, emergency medicine, atopic dermatitis, psoriasis, scabies, dermatophytosis.

Introduction

Fungal skin diseases, eczema, psoriasis, and scabies account for a large burden of illness worldwide, and their relative importance differs between age groups and populations (1). The route to diagnosis differs by condition, as illustrated by a European population survey in which respondents most frequently attributed the diagnosis of atopic dermatitis and psoriasis to a dermatologist and fungal skin infections to a general practitioner (2). A study restricted to dermatology referrals describes only one part of the clinical pathway, particularly for fungal infections diagnosed and treated at the first consultation (1,2).

Atopic dermatitis is diagnosed from the combination of pruritus, a characteristic distribution of lesions, and a chronic or relapsing course, with age influencing the sites involved (3). Psoriasis also produces recurrent scaly lesions, although sharply demarcated plaques, extensor involvement, scalp disease, and characteristic nail changes support its recognition (4). The distinction is relevant when interpreting diagnostic records because “eczema” describes several patterns of inflammation, whereas atopic dermatitis identifies a specific clinical disorder with characteristic findings and history (3,4).

Scabies and tinea introduce a different diagnostic problem because each resembles inflammatory disease and each has an identifiable causative organism (5,6). The international scabies criteria distinguish confirmed infestation, which requires visualization of the mite or its products, from clinical and suspected infestation, which depend on examination findings and history (5). Tinea corporis classically presents with a scaly advancing border, although previous corticosteroid exposure alters its appearance and reduces the diagnostic value of inspection alone (6). Distinguishing dermatophytosis from inflammatory disease has immediate therapeutic relevance, as randomized trials summarized in a Cochrane review document the effectiveness of topical antifungal treatment for tinea corporis and cruris (7).

These four conditions present related diagnostic challenges with different opportunities for verification, ranging from clinical assessment of relapsing dermatitis to direct demonstration of an infectious agent (3-6). A further distinction concerns the question being asked: recognition of dermatologist-diagnosed disease and confirmation of a diagnosis already proposed by a physician describe different events in the same clinical pathway. We examined both questions across primary and emergency care, with particular

10/11/2026

attention to the direction of error, the setting of the first examination, and the distinction between a specific diagnosis and a broad descriptive label.

Methods

Review design and eligibility

We structured the review around the population, index assessment, reference assessment, and target conditions used in diagnostic accuracy reviews. Eligible populations comprised children or adults assessed for a skin complaint by a primary care physician, general practitioner, community pediatrician, or emergency physician. The index assessment was the clinician's initial diagnosis, including a diagnosis recorded in a referral letter. The reference assessment was a dermatologist's diagnosis following direct examination or review of clinical images and history, with histopathology or follow-up accepted when incorporated into the original study.

Information sources and study selection

The publication cutoff was 31 May 2026. Searches of publicly retrievable bibliographic records and journal reports used combinations of *primary care*, *general practitioner*, *pediatrician*, *emergency department*, *dermatologist*, and *teledermatology* with *diagnostic accuracy*, *agreement*, *concordance*, *diagnostic error*, and *referral*. Disease terms included *atopic dermatitis*, *atopic eczema*, *psoriasis*, *scabies*, *tinea*, *dermatophyte infection*, and *dermatophytosis*. Searches without disease names identified referral studies whose titles described skin disorders collectively. PubMed records, publisher full texts, and references in relevant reports provided the comparative evidence. Cochrane reviews contributed clinical background.

Two authors reviewed studies for eligibility. Original studies reporting paired clinical diagnoses or a documented pattern of diagnostic errors contributed to the disease-specific synthesis. Broader comparative cohorts contributed setting-level evidence when they reported agreement, diagnostic revision, or the reference assessment used for patients with undifferentiated skin disease. We excluded isolated case reports, treatment surveys, comparisons restricted to dermatologists, and studies reporting disease frequency without a comparison of diagnoses. Educational vignettes were considered separately in the discussion.

Data extraction and synthesis

We extracted setting, population, recruitment method, clinician type, reference assessment, diagnostic category, outcome definition, and denominator. Sensitivity described recognition among patients with the reference diagnosis, while positive predictive value described confirmation among patients assigned that diagnosis by the initial physician. We retained the term *agreement* when the publication did not clearly establish a denominator for either measure. We preserved separate categories for atopic dermatitis and unspecified eczema, and for dermatophytosis and broader fungal disease.

The appraisal considered referral selection, missing provisional diagnoses, specialist access to clinical information, selective testing, and the precision of small disease subgroups. We recorded whether emergency and community cases were distinguishable and whether a study combined diagnostic and treatment changes. We used narrative synthesis because the studies differed in recruitment, diagnostic categories, reference assessments, and measures of performance. We did not derive specificity from agreement or combine estimates with different denominators.

Results

Study characteristics and primary care evidence

Twelve original studies contributed clinical evidence, seven reported disease-specific

10/11/2026

recognition or patterns of error, and five provided broader comparisons from emergency departments or primary care referral pathways (8-19). Porta et al. evaluated 3,164 first dermatology visits in Spain, although only 1,888 referrals contained a tentative diagnosis; the reported overall agreement of 65.52% therefore describes comparisons in which the referring clinician supplied a diagnostic label (8). In the United Kingdom, Basarab et al. found the correct diagnosis in 47% of 686 consecutive referral letters, with substantially better recognition of psoriasis than the overall result suggested (9). In Bahrain, 160 of 237 referrals agreed with the dermatologist, and the investigators counted 33 referrals without a proposed diagnosis as failures to reach a diagnosis (10).

Psoriasis and atopic dermatitis

Psoriasis recognition differed markedly across primary care populations, including studies in which physicians assessed patients directly before dermatology review (8-12). In Spain, psoriasis sensitivity was 88.8%, positive predictive value was 98.6%, and κ was 0.931; the British study reported correct recognition in 78%, and the Bahrain study reported agreement in six of eight cases (8-10). In North India, the primary care physician identified two of fourteen dermatologist-diagnosed psoriasis cases, while maritime general practitioners recorded psoriasis less frequently than the reviewing dermatologist (11,12). A prospective survey of primary care errors also identified psoriasis among the inflammatory conditions that physicians underdiagnosed (13).

For atopic dermatitis, the Spanish estimates were 85% sensitivity and 94.4% positive predictive value, compared with 88.6% sensitivity and 63.3% positive predictive value for the study's separate eczema category (8). In France, pediatricians agreed with a dermatologist in 73% of atopic dermatitis cases, compared with 55% across all skin conditions in the same sample. The French estimate combined 53 emergency and 46 community patients, precluding attribution of the 73% figure to either setting alone (14).

Scabies, tinea, and emergency assessment

In Spain, the single provisional scabies diagnosis was confirmed, although sensitivity was only 25%; in India, the physician recognized 16 of 18 specialist-diagnosed cases and also labeled 11 eczema cases and all five papular urticaria cases as scabies (8,11). Agreement for tinea was two of six cases in Bahrain, while maritime clinicians identified two of twelve cases classified as tinea by the dermatologist (10,12). The Indian physician assigned dermatophyte infection more frequently than the specialist, including six of seven cases ultimately classified as polymorphous light eruption (11).

In a French pediatric emergency cohort, specialist assessment changed the diagnosis in 42% of evaluated cases, and a Mexican pediatric emergency study reported 62.7% agreement across 185 patients (15,16). Real-time emergency teledermatology clarified, expanded, or revised diagnosis and management in 75 of 110 evaluable cases; that composite outcome does not identify how many initial diagnoses were incorrect (17). Two Australian referral studies reported overall concordance of 42% and 57%, respectively, with histopathology or follow-up contributing to the reference assessment in selected patients (18,19).

10/11/2026

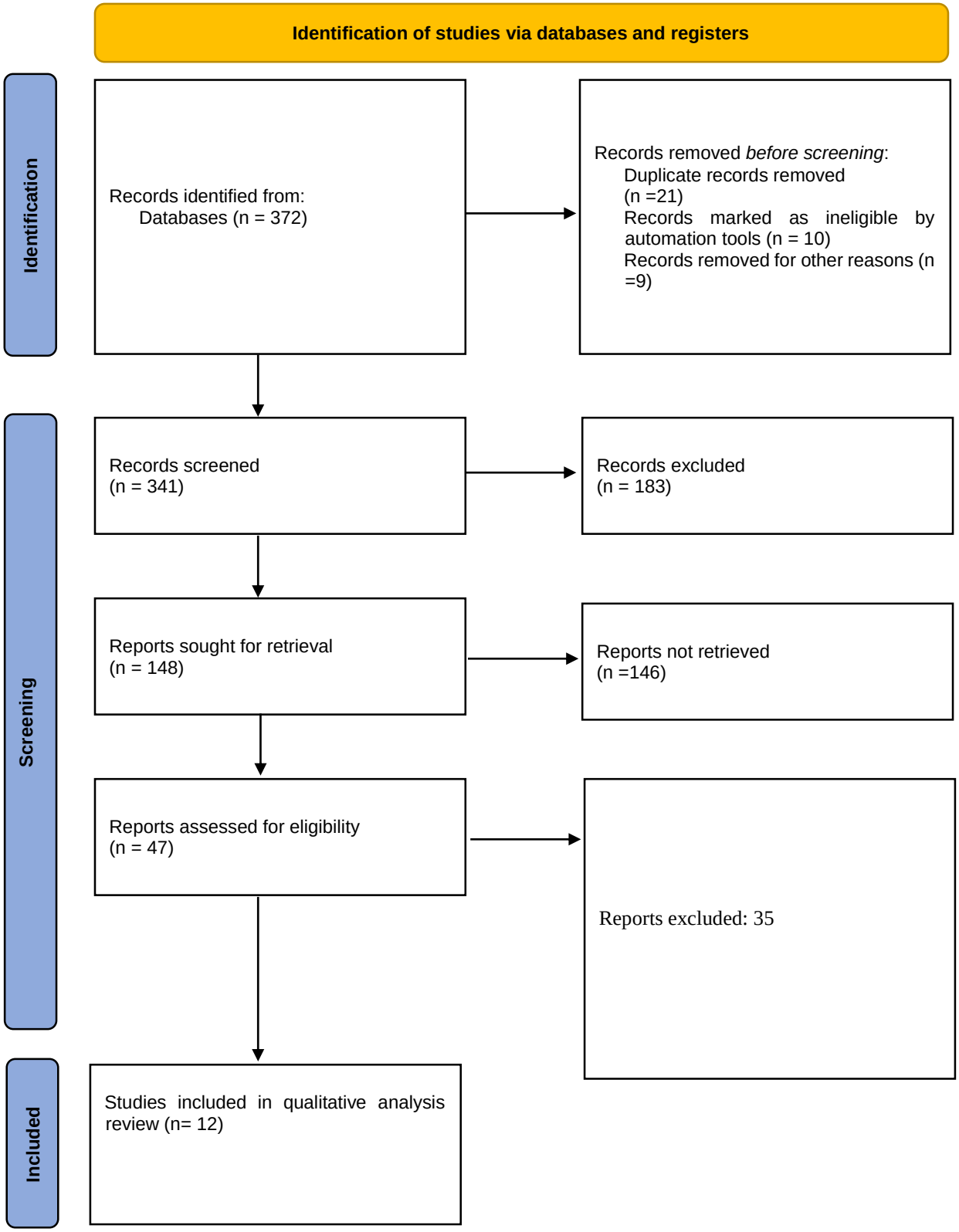


Figure 1: PRISMA flow chart

10/11/2026

Table 1. Characteristics and interpretation of the 12 included studies

Study	Setting and sample	Main outcome	Interpretation
Porta et al. (8)	Spain, 3,164 first dermatology visits	Overall agreement 65.52% where a tentative diagnosis was available	Only 1,888 referrals supplied a tentative diagnosis. Disease-specific sensitivity and PPV were reported separately (8).
Basarab et al. (9)	United Kingdom, 686 consecutive GP referrals	Correct diagnosis in 47% of letters; psoriasis recognized in 78%	One consultant assessed the referrals over six months (9).
Al-Fayez et al. (10)	Bahrain, 237 evaluable referrals	Overall agreement 160/237, or 67.5%	Thirty-three referrals without a diagnosis remained in the denominator (10).
Patro et al. (11)	North India, 206 primary care patients	Overall agreement 56%; condition-specific κ ranged from 0.27 for psoriasis to 0.56 for scabies	Paired assessments identified both missed cases and specific alternative diagnoses (11).
Di Canio et al. (12)	Maritime telemedicine, 420 cases with sufficient information	κ was 0.341 for psoriasis and 0.280 for tinea	Ninety-two of 512 dermatology requests lacked sufficient information for inclusion (12).
Pariser and Pariser (13)	United States, 260 patients with identified errors	319 errors; 88% involved diagnosis	The error series describes the direction of mistakes without establishing their frequency among all consultations (13).
Moiny-Fouquet et al. (14)	France, 99 children in emergency or community care	Diagnostic agreement 55% overall and 73% for atopic dermatitis	A dermatologist reviewed photographs and clinical information from both settings (14).
Auvin et al. (15)	France, prospective emergency cohort of 395 children	Specialist assessment changed diagnosis in 42% and treatment in 30% of evaluated cases	Atopic dermatitis was among the six leading conditions; the revision rate covered the combined case mix (15).

10/11/2026

Study	Setting and sample	Main outcome	Interpretation
Alba-Rojas et al. (16)	Mexico, 185 pediatric emergency patients	Overall agreement 62.7%; κ 0.472	The estimate includes inflammatory, infectious, and other diagnostic categories (16).
Duong et al. (17)	France, 111 emergency patients enrolled	Specialist input clarified, expanded, or revised assessment in 75/110	The outcome combines changes to diagnosis and management (17).
Tran et al. (18)	Australia, 656 consecutive GP referrals	Overall concordance 42%; histology available in 151 cases	Biopsied patients represent a selected subgroup of the referral population (18).
Moreno et al. (19)	Australia, 315 conditions assessed by 165 GPs	Overall concordance 57%; correct diagnosis in 44% of rashes requiring diagnosis	The reference incorporated specialist examination, histopathology, or follow-up (19).

Table 2. Disease-specific diagnostic findings

Condition	Clinical comparison	Reported finding	Interpretation
Atopic dermatitis	Spanish primary care referrals	Sensitivity 85.0%; PPV 94.4%; κ 0.894	Most provisional diagnoses were confirmed, and some specialist-diagnosed cases were missed (8).
Atopic dermatitis	French pediatric emergency and community care	Agreement 73%	The estimate applies to the combined pediatric sample (14).
Psoriasis	Spanish and British referrals	Spain: sensitivity 88.8%, PPV 98.6%; United Kingdom: 78% correctly diagnosed	Both cohorts showed strong recognition, using different reported measures (8,9).
Psoriasis	Bahrain, North India, and maritime medicine	Bahrain: 6/8 agreed; India: 2/14 recognized; maritime service: κ 0.341	Recognition varied across referral, local primary care, and remote assessments (10-12).
Scabies	Spanish referrals	Sensitivity 25%; PPV 100%; κ 0.399	The PPV was based on a single provisional diagnosis (8).

10/11/2026

Condition	Clinical comparison	Reported finding	Interpretation
Scabies	Bahrain and North India	Bahrain: 10/14 agreed; India: 16/18 reference cases recognized	In India, false-positive diagnoses included eczema and papular urticaria (10,11).
Tinea or dermatophyte infection	Bahrain, North India, and maritime medicine	Bahrain: 2/6 agreed; India: κ 0.49; maritime service: 2/12 reference cases recognized	The reports identify both underrecognition and excessive use of a fungal diagnosis (10-12).

Discussion

Primary care physicians recognized most specialist-diagnosed cases in one referral service and only two of fourteen in another clinical population (8,11). The difference matters because a high positive predictive value in a referral clinic addresses what happens after a clinician proposes psoriasis; it provides limited information about patients assigned a different diagnosis or referred with a description alone (8,9). Longitudinal data from two British primary care databases adds a complementary finding, during the year before psoriasis was recorded, patients subsequently diagnosed with psoriasis were more likely than controls to receive diagnoses of eczema or tinea corporis (20). Those earlier labels identify opportunities for reassessment, although the records do not establish that every preceding episode represented psoriasis (20).

Age also affects the clinical distinction between psoriasis and atopic dermatitis, particularly when both enter the differential diagnosis of a persistent scaly eruption (3,4,21). In a multicenter study of 170 children with dermatologist-diagnosed psoriasis and 160 with another scaly inflammatory rash, the most informative features included hairline involvement, changes at the external auditory meatus or umbilicus, extensor plaques, and family history (21). These findings give clinical meaning to a limitation of referral records: a broad label such as "eczema" preserves little information about distribution, chronicity, or examination of sites that distinguish the two conditions (3,8,21).

Scabies illustrates why a missed diagnosis and an incorrect positive diagnosis deserve equal attention in a diagnostic review (5,8,11). The Indian physician recognized most reference-positive cases, although patients with eczema and papular urticaria also received a scabies diagnosis; the Spanish series showed the opposite practical problem, with few cases identified at referral (8,11). The international criteria offer a way to document the data behind a diagnosis, and a community validation study in Liberia demonstrated the feasibility of comparing trained nonspecialist examiners with dermatologists using standardized criteria (5,22). Recording contact history, lesion distribution, and the basis for diagnostic certainty would make disagreement more interpretable than a comparison of diagnostic labels alone (5,11,22).

For tinea, the clinical series reveal errors in both directions, maritime clinicians overlooked dermatologist-diagnosed cases, while the Indian physician assigned dermatophyte infection to several patients with a light-induced eruption (11,12). In a Saudi Arabian vignette study, 86.9% of

10/11/2026

primary care physicians identified the tinea pedis example correctly, showing how recognition of a selected image differs from assessment of a patient with an undifferentiated rash (10-12,23). Previous treatment, the body site examined, and the availability of an active border for sampling are clinically relevant details when interpreting disagreement about a fungal diagnosis (6,7).

The principal limitation of the emergency data is the absence of a comparable primary care group examining the same patients under the same conditions (14-17). A change in treatment, clarification of a provisional diagnosis, and replacement of an incorrect diagnosis have different implications, although some emergency studies combined these events (14,15,17). Future studies would provide more informative estimates by recruiting consecutive patients, retaining uncertain assessments, and reporting paired disease-specific counts with a clearly defined reference assessment, consistent with diagnostic accuracy reporting guidance.

Conclusion

Primary care recognition of atopic dermatitis and psoriasis was high in some referral cohorts, although psoriasis recognition differed substantially across settings. Scabies produced errors in both directions: physicians missed confirmed cases and assigned infestation to patients with other pruritic eruptions. Tinea was underrecognized in two small clinical series, while another study documented overdiagnosis of dermatophyte infection. Emergency studies established frequent diagnostic disagreement across mixed presentations, with limited evidence for individual diseases. The available comparisons do not support ranking primary care and emergency physicians. Recording provisional diagnoses, alternative diagnoses, and specialist findings would improve the interpretation of future comparisons across clinical settings.

Abbreviations

Abbreviation or symbol	Definition
GP	General practitioner
PPV	Positive predictive value
κ	Cohen's kappa coefficient

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10/11/2026

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10/11/2026

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10/11/2026