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Atopic dermatitis, atopic eczema, or eczema? A systematic review, meta-analysis, and recommendation for uniform use of ‘atopic dermatitis’

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Abstract

Background—The lack of standardized nomenclature for atopic dermatitis (AD) creates unnecessary confusion for patients, healthcare providers, and researchers. It also negatively impacts accurate communication of research in the scientific literature. We sought to determine the most commonly used terms for AD.

Methods—A systematic review of the MEDLINE, EMBASE, and LILACS (1945–2016) for the terms AD, atopic eczema (AE), and multiple other eczematous disorders.

Results—In MEDLINE, 33 060 were identified, of which 21 299 (64.4%) publications used the term ‘AD’, 15 510 (46.9%) ‘eczema’, and only 2471 (7.5%) AE. Most of these publications used the term AD (82.0%) or eczema (70.8%) without additional nomenclature; only 1.2% used AE alone. Few publications used the terminology ‘childhood eczema’, ‘flexural eczema’, ‘infantile eczema’, ‘atopic neurodermatitis’, or ‘Besnier’s prurigo’. AD was rarely used until the late 1970s,

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Author contributions

JI Silverberg had full access to all the data in the study and takes responsibility for the integrity of the data and accuracy of the data analysis. JI Silverberg conceived and designed the study; JI Silverberg and R Kantor acquired the data; JI Silverberg, R Kantor, AS Paller, and J Thyssen analyzed and interpreted the data; JI Silverberg, R Kantor, and J Thyssen drafted the manuscript; JI Silverberg, R Kantor, AS Paller, and J Thyssen critically revised the manuscript for important intellectual content; JI Silverberg and R Kantor carried out statistical analysis; and JI Silverberg obtained funding.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Figure S1. Publication trends for AD, AE, and eczema in the scientific literature (1940–2015) from EMBASE.

Table S1. Search terms used for the study.

after which it became the most commonly used of the three terms and continuously increased until 2015. Atopic eczema decreased between 2008 and 2015. Atopic dermatitis was the most commonly used term in studies across almost all publication types, languages, and journals.

Conclusion—Atopic dermatitis is the most commonly used term and appears to be increasing in popularity. Given that eczema is a nonspecific term that describes the morphological appearance of several forms of dermatitis, we strongly suggest the use of a more specific term, AD, in publications, healthcare clinician training, and patient education. Support from researchers, reviewers, and editors is key to success.

Keywords

atopic dermatitis; atopic eczema; eczema; nomenclature; terminology

Atopic dermatitis (AD) is a chronic inflammatory skin disease that is characterized by intense pruritus and eczematous lesions in typical anatomical sites (1). The gold standard diagnostic criteria for AD were published in 1979 by Hanifin and Rajka (2) and reflect the heterogenous presentation of disease across race and age. For example, infantile AD features dermatitis of the face, scalp, and extensors, whereas late-childhood AD and adulthood AD classically present with flexural eczema (3).

Controversy persists regarding the ideal nomenclature for AD (4). Atopic dermatitis was first coined by Sulzberger and Wise in 1933, a decade after the term atopy was introduced by Coca and Cooke (4). In 2004, the World Allergy Organization (WAO) published a consensus statement supporting the use of the term eczema, instead of AD or atopic eczema (AE), with atopic and nonatopic subtypes (5). Eczema is also the most commonly used term by patients and physicians alike (6). Despite the WAO consensus statement, a variety of different terms are still used for AD, including AE, eczema, infantile eczema, atopiform dermatitis, flexural eczema, and atopic neurodermatitis. There has been a continuing debate about proper terminology since Hill and Sulzberger promoted the term AD or AE instead of eczema (7).

Importantly, terminology is not a matter of sophisticated academic discussion. Rather, the discrepant nomenclature raises several challenges. First, accurate and consistent nomenclature of the condition is important for AD patients to properly remember and understand what their skin disorder is. Second, proper terminology is an important component of entry criteria in clinical trials (8). Given the numerous therapeutic agents for AD in development, there is an increasing need for international harmonization of disease nomenclature. Finally, the different terms AD and eczema raise major challenges with respect to billing and data mining of electronic health records. That is, the term AD is associated with the ICD-9 code 691.8 and ICD-10 code L20.x. However, the term eczema is associated with the ICD-9 code 692.9 and ICD-10 code L30.9. Thus, the use of these different terms by clinicians may introduce systematic coding errors that have ramifications for reimbursement and payer coverage for medications.

Despite consensus statements and theoretical arguments for or against certain terminology, little empirical evidence exists to support the use of a single name for AD. This study sought

to determine the most commonly used term used for AD in the scientific literature and identify whether there have been any recent changes in the trends of terminology use.

Methods

Literature search

We searched the following databases through May 25, 2016: MEDLINE (1946–present), EMBASE (1940–present), and LILACS (1982–present). The search strategy was designed to identify any manuscripts with the most commonly used nomenclature for AD, including ‘atopic dermatitis’, ‘atopic eczema’, and/or ‘eczema’, as well as specific subtypes of eczema (Table S1).

Studies published online and in print from all years were considered. All search results with titles and abstracts written in any language were eligible for inclusion. Our *a priori* goal was to determine the commonality of different nomenclature terms for AD across the entire scientific literature. Therefore, no formal exclusion criteria were used.

Data extraction

One reviewer (RK) independently performed data extraction from these database search engines using their respective search metrics and filters. The total number of publications was collected for the following: all available years, annual trends, study types, different research subjects, and the highest impact factor journals in dermatology, allergy/immunology, pediatrics, and medicine. Summary statistics were determined using Excel 2016 (Microsoft, Redmond, WA, USA), including total frequency and percentages.

Results

Search volume

In searches of MEDLINE and EMBASE, there were 33 060 and 65 705 publications identified, respectively, which used the term AD, AE, or eczema. Atopic dermatitis was the most commonly used term in the scientific literature. In MEDLINE, 21 299 (64.4%) publications were identified that used the term AD, whereas 15 510 (46.9%) used the term eczema, and only 2471 (7.5%) used the term AE (Fig. 1A). However, many publications used more than one of these terms. The majority of publications using AD or eczema solely used these terms (82.0% and 70.8%, respectively) without additional nomenclature; however, some publications used combinations of AD, AE, and/or eczema as depicted in a Venn diagram (Fig. 1A). Few publications used the term AE alone (1.2%). In publications identified through EMBASE, the term eczema was used slightly more often than AD (AD: $n = 36\,156$; 55.0%; eczema: $n = 37\,416$; 56.9%; and AE: $n = 4066$; 6.2%) (Fig. 1B). There were far more publications that used eczema or AD than AE, with relatively similar proportions of combinations of terms. In LILACS, eczema was the most commonly used term ($n = 1508$ publications), followed by AD ($n = 791$) and AE ($n = 592$). We were not able to determine the proportion of publications that used combinations of terms.

In searches of MEDLINE and EMBASE, few publications used the terminology ‘childhood eczema’, ‘flexural eczema’, ‘infantile eczema’, ‘atopiform dermatitis’, ‘atopic

neurodermatitis', or 'Besnier's prurigo' (Fig. 2A, B). In contrast, the term eczema was more commonly used in conjunction with an adjective as a label for eczematous disorders other than AD, for example, 'hand eczema', 'contact eczema', 'dyshidrotic eczema', and 'eczema herpeticum'. In fact, publications that used these terms for nonatopic forms of eczema outnumbered those that used AE.

Publication trends

In MEDLINE, the number and percentage of publications using the terminology AD, AE, and/or eczema increased between 1940 and 2015 (Fig. 3A, B). Atopic dermatitis was rarely used until the late 1970s, after which it became the most commonly used term and its use continuously increased through 2015. The use of AE increased until 2008, after which its use decreased; however, AE was used less commonly than AD in all years. Finally, the term eczema was most commonly used in the pre-1970s, decreased slightly until 1994, and has steadily increased through 2015. Similar results were found for publications that only used a single term of AD, AE, or eczema without overlap (Fig. 3C or D). Similar time trends were observed in EMBASE, although publications with AD exceeded those with eczema in 1990 (Fig. S1).

Predictors of terminology

In MEDLINE, AD was the most commonly used term in studies of adults and children, humans and animals, males and females, followed by eczema alone and then AE (Fig. 4A). In addition, AD was the most commonly used term in publications written in English, Japanese, and Spanish languages. However, eczema was the commonly used term in publications written in French, German, Italian, and Russian. Atopic eczema was least commonly used across all publication types and languages. Finally, AD followed by eczema was most commonly used in clinical trials, comments, comparative studies, controlled clinical trials, letters, multicenter studies, randomized controlled trials, reviews, and systematic reviews. However, eczema was more commonly used than AD in case reports. Nearly identical patterns were observed in EMBASE, although publications using eczema exceeded those of AD in adults, but no other group (Fig. 4D–F).

Across the highest impact factor dermatology and allergy/immunology journals, AD was the most commonly used term, followed by eczema (Fig. 5). However, the use of the term eczema was greater than that of AD in medicine and pediatrics journals. The term AE tended to be used more in journals based in Great Britain, for example, *British Journal of Dermatology*, *Lancet*, and *British Medical Journal*, although AE was still less commonly used in these journals than either AD or eczema (Fig. 5).

Discussion

The present study found that the term AD is more commonly used than eczema and that eczema was far more common than AE. Publications using the terms AD and AE increased in the late 1970s, coinciding with the discussion of the seminal classification for AD at the International Symposium of Atopic Dermatitis in Oslo in 1979, followed by the publication of the Hanifin and Rajka criteria for AD (2). Moreover, the increased number of publications

coincided with the rapidly increased prevalence of AD (9–11). However, publications using AD continue to increase annually, while publications using AE have slightly decreased annually between 2008 and 2015. In contrast, the term eczema was commonly used in conjunction with adjectives other than atopic, for example, hand eczema and contact eczema. In fact, the use of eczema with one of these adjectives was more common than the use of AE.

These results have important ramifications for disease nomenclature and patient education. Eczema is a descriptive morphological and/or histological term, not a single entity. Several skin conditions can present with eczematous lesions, among them AD and allergic and irritant contact dermatitis. While the terms AD and AE are focused and clearly indicate a specific subtype of eczema with its own course, the term eczema by itself is not sufficient to distinguish among various disparate etiologies. However, eczema is frequently used as a lay term synonymous with AD.

Standardization of the nomenclature for AD or AE *vs* eczema alone has important implications for billing and reimbursement, clinical and epidemiological research, and patient communication. The ICD-9 and ICD-10 codes for AD (691.8 and L20.x, respectively) are distinct from those of eczema (692.9 and L30.9, respectively). Entry of eczema in many electronic health records will apply incorrect ICD codes, which may have ramifications for reimbursement and patients' access to medications for their AD. It is therefore imperative that the more precise terminology of AD or AE be used instead of eczema alone.

The present study demonstrated that the annual number of publications using AE has decreased between 2008 and 2015. This may be attributed to a consensus statement published by the WAO in 2004 that proposed that the term eczema replace AD or AE (5). However, many experts admit that eczema is a fundamentally ambiguous term and its broad use would represent 'a step backward' (7). The results of the present study indicate that the terms eczema alone and eczema in conjunction with other adjectives are used more commonly than AE. These different etiologies of eczema may introduce confusion for patients about their diagnosis. Thus, we propose a concerted effort on the part of clinicians and scientists to avoid the use of the term eczema alone as a synonym for AD, whether in the scientific literature or patient education. Rather, a more precise term of AD or AE is warranted. Given that AD is by far the more commonly used term, we propose that AD be the only term used for disease nomenclature in the scientific literature. Establishing international agreement on the nomenclature of AD is essential. In addition, the ambiguity of the term eczema should be taught to healthcare providers, researchers, and patients, a practice which will require support from reviewers and journal editors. Uniform utilization of a specific term, AD, has important implications for clinical practice, research, and patient health literacy.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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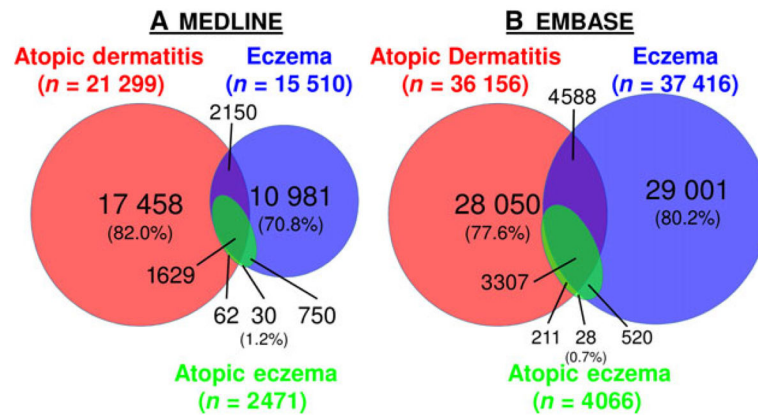


Figure 1.

Venn diagram of number of publications using the terms 'atopic dermatitis' (red), 'atopic eczema' (green), and/or 'eczema' (blue).

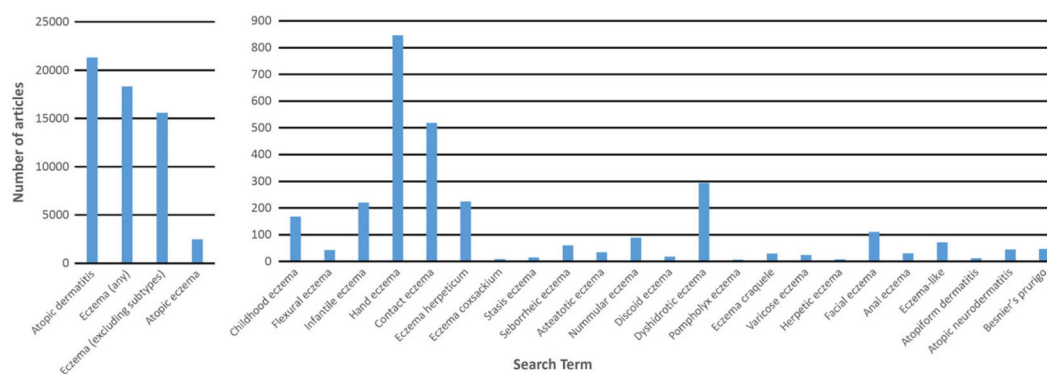


Figure 2.
Total number of publications using different terms for atopic dermatitis and other eczematous disorders.

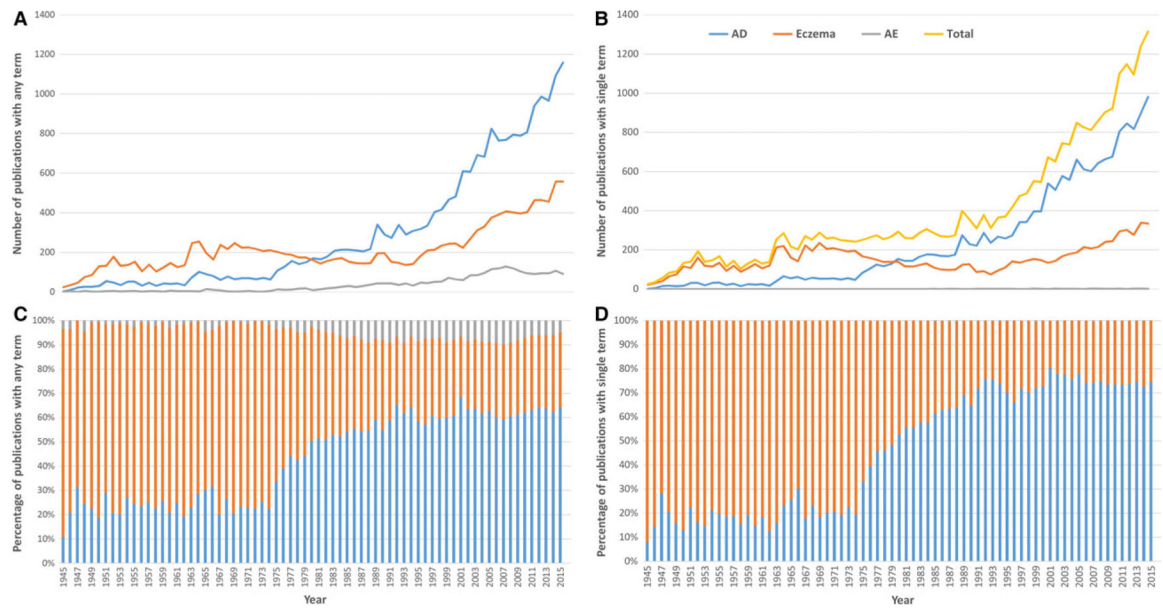
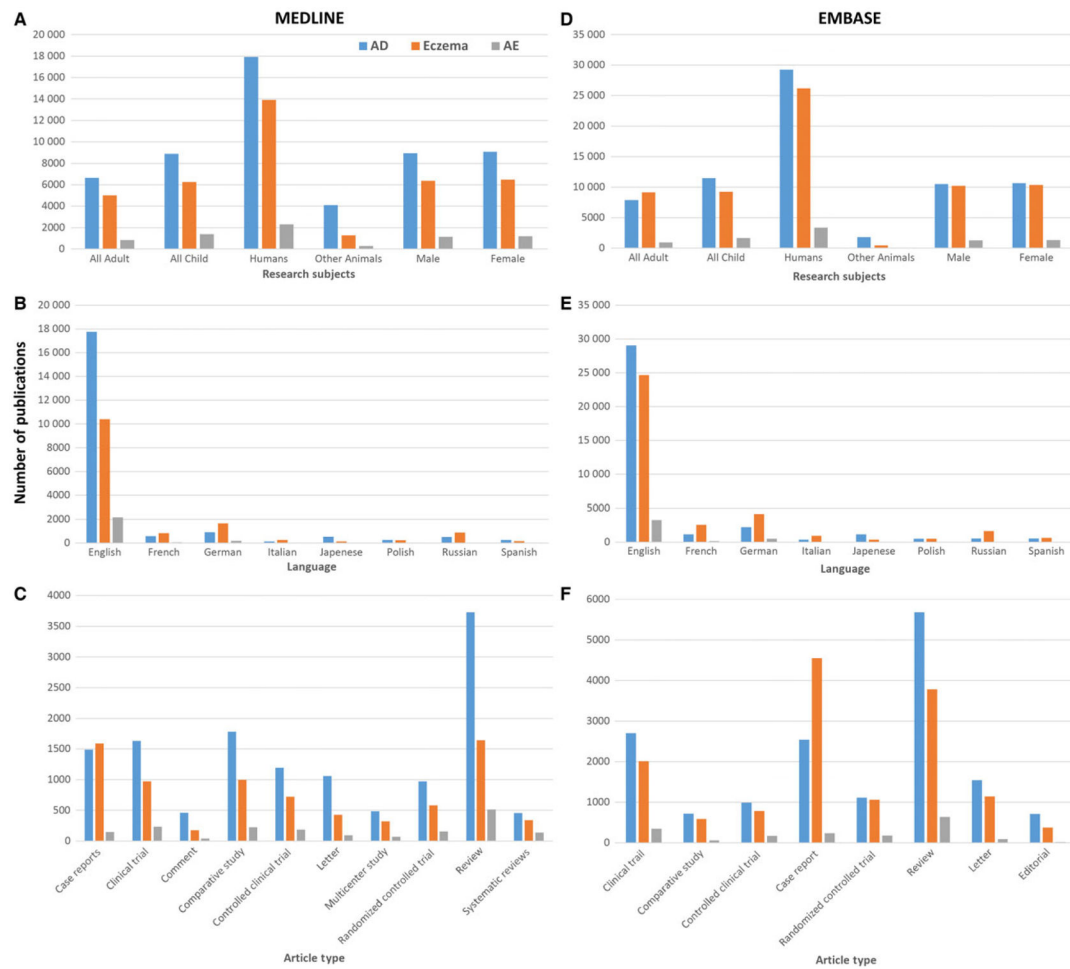


Figure 3.

Publication trends for atopic dermatitis (AD), atopic eczema (AE), and eczema in the scientific literature (1945–2015) from MEDLINE. The absolute number (panel A) and percentage (panel B) of publications using one or more of the terms AD (blue), eczema (red), and/or AE (gray) are presented. In addition, the absolute number (panel C) and percentage (panel D) of publications using only a single term of AD (blue), eczema (red), and/or AE (gray) are presented.

**Figure 4.**

Predictors of use of atopic dermatitis (AD), atopic eczema (AE), and eczema in the scientific literature. The absolute number of publications using the terms AD (blue), eczema (red), and AE (gray) was stratified by the nature of the research subjects (panel A), publication language (panel B), and publication type (panel C).

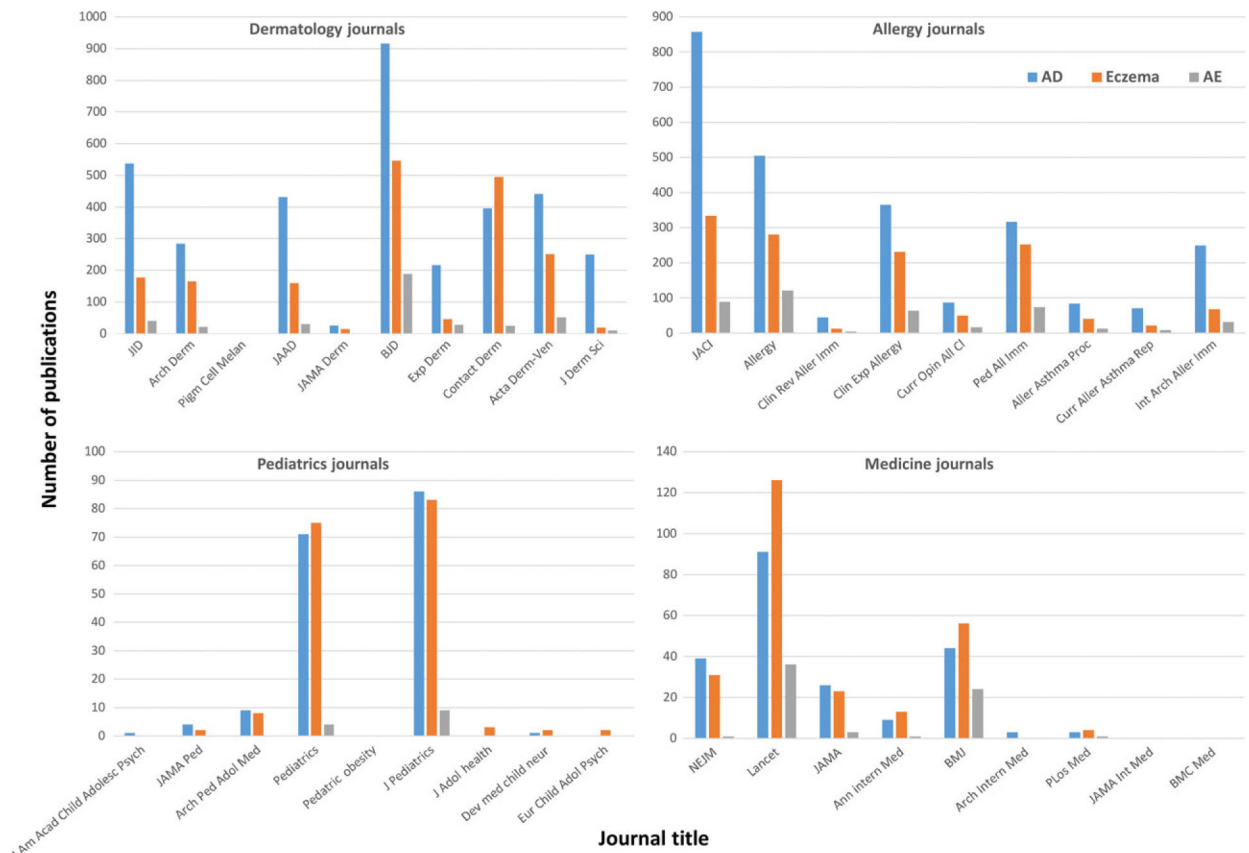


Figure 5.

The proportion of publications using the terms atopic dermatitis (AD), atopic eczema (AE), or eczema does not vary by the impact factor of the publishing journal. The absolute number of publications using the terms AD (blue), eczema (red), or AE (gray) was stratified by the journals with top 10 impact factors for dermatology (top left panel), allergy/immunology (top right panel), pediatrics (bottom left panel), and medicine (bottom right panel).