

Use of immunology and immunodeficiency topics in UpToDate

E. Richard Stiehm, MD^a, Elizabeth C. TePas, MD^{b,c}, and Anna M. Feldweg, MD^{b,c}



Clinical Implications

- These data identify the major immune problems and areas of uncertainty encountered by the generalist and the allergy/immunology specialist and also how other physicians find UpToDate of value in their practice.

TO THE EDITOR:

UpToDate is an online resource of synthesized medical information, consisting of nearly 10,000 topic reviews. The mission of UpToDate is to improve the quality and effectiveness of health care by answering clinical questions quickly at the point of care. UpToDate is used by medical personnel in their offices and clinics and in the inpatient wards of most major US medical centers.¹⁻³ Use of UpToDate has grown steadily in the United States and around the world, and in 2016, the program passed a milestone of more than 1 million topic views per day.

UpToDate has contained immunology and immunodeficiency content for over a decade. There are 107 topics on immunology and immunodeficiency, including 30 topics on basic science, 33 on general aspects of immunology (such as immune globulin therapy), and 54 topics on specific primary immunodeficiency disorders (PIDs). Nearly 4000 subscribers identify themselves as specialists in allergy/immunology (A/I). However, clinical immunology is a small field, and although there are now more than 350 identified PIDs,⁴ many disorders are quite rare. Therefore, we were interested in knowing which topics were being accessed most by all subscribers and by A/I subscribers specifically. We did not include allergy topics in this analysis. Specifically, we excluded topics about anaphylaxis; urticaria; angioedema; food, drug, inhalant, and venom hypersensitivity; asthma; sinus disease; and other allergic disorders, most of which are accessed significantly more often than immunology topics.

The most-viewed topics in immunology and immunodeficiency, by all subscribers, are presented in [Table I](#). The most popular topics were either general diagnostic approach topics, such as the evaluation of unexplained eosinophilia or recurrent infections, or topics that discussed therapies used by multiple specialties (immune globulin, glucocorticoids), or topics that discussed more common PIDs, such as the different antibody defects. These 20 immunology and immunodeficiency topics viewed by all subscribers in 2016 ranged from nearly 280,000 views for the topic “Approach to the patient with unexplained eosinophilia” to nearly 25,000 views for the topic “Primary humoral immunodeficiencies: An overview.” The median article (number 10 on the list) was accessed nearly 40,000 times. For comparison, the most-viewed topic in UpToDate across all specialties was “Acute uncomplicated cystitis and pyelonephritis

in women,” which was viewed more than 782,000 times, that is, more than 2000 times daily.

The 4 topics bolded in the list of most-viewed topics for all subscribers ([Table I](#)) are not on the list of most-viewed topics by A/I specialists. Two of these topics were rare immunologic disorders that have relatively common presenting signs and symptoms. An analysis of the search terms entered by users to access those topics revealed that the terms “aphthous ulcers” or “periodic fever syndromes” led them to “Periodic fever with aphthous stomatitis, pharyngitis and adenitis (PFAPA syndrome).” The search terms “congenital heart disease,” “hypocalcemia,” and “chromosomal disorders” led users to “DiGeorge (22q11.2 deletion) syndrome.” The 2 other topics unique to the list for all subscribers were “Glucocorticoid effects on the immune system” and “Overview and clinical assessment of the complement system.” Both these immunology topics span multiple specialties and cover areas that generate frequent clinical questions.

Other primary immunodeficiency articles viewed by all subscribers focused more on recognition of clinical features and diagnosis of specific primary immunodeficiencies rather than their management, because these rare disorders are more frequently included in their differential diagnosis than are actually diagnosed. These include “common variable immunodeficiency,” “chronic granulomatous disease,” “selective IgA deficiency,” “IgG subclass deficiency,” and “hyperimmunoglobulin E syndrome.” The articles’ sections on recognition, clinical features, and diagnosis are used more than the section of management because most generalists refer these patients to an immunologist.

The most-viewed topics by A/I subscribers are presented in [Table II](#). The most-viewed topics again concern general diagnostic approaches, such as the evaluation of eosinophilia or the patient with recurrent infections, or the most common primary immunodeficiencies. The most-viewed topic in immunology and immunodeficiency for A/I users was the same as for all users. The top 20 topic reviews in 2016 ranged from more than 3000 for “Approach to the patient with unexplained eosinophilia” to more than 500 for “Approach to the child with recurrent infections.” The median article (number 10 on the list) was viewed more than 900 times. The 4 topics bolded in [Table II](#) that do not appear in the most-viewed topics by all subscribers were “Subcutaneous and intramuscular immune globulin therapy,” “Treatment and prognosis of common variable immunodeficiency,” “Assessing the immunologic response to vaccination,” and “Specific antibody deficiency.” These are topics that are more specific to the practice of clinical immunology and immunodeficiency.

How is UpToDate used by clinicians? Maggio et al reported that physicians use UpToDate to (1) refresh one’s knowledge and keep current; (2) confirm one’s knowledge (eg, determine whether experts agree with one’s approach); (3) rapidly access a specific piece of information (eg, the half-life of a medication); (4) assist with teaching (eg, answering questions during rounds or preparing for a teaching assignment or lecture); (5) obtain evidence-based treatment recommendations for gaps in knowledge when one is unfamiliar with a certain disorder; and (6) indulge in “personal learning” (eg, expansion of one’s overall

TABLE I. Immunology and immunodeficiency topics viewed most often in 2016 by all UpToDate subscribers

Rank	Topic	Author(s)
1	Approach to the patient with unexplained eosinophilia	Peter Weller, MD, Amy Klion, MD
2	Overview of intravenous immune globulin (IVIG) therapy	Arthur Silvergleid, MD, Mark Ballow, MD
3	Eosinophil biology and causes of eosinophilia	Peter Weller, MD, Amy Klion, MD
4	Approach to the adult with recurrent infections	Mark Pasternack, MD
5	Intravenous immune globulin: Adverse effects	Elena Perez, MD, PhD, Arthur Silvergleid, MD
6	What's new in allergy and immunology	Anna Feldweg, MD, Elizabeth TePas, MD, MS
7	Clinical manifestations, epidemiology, and diagnosis of common variable immunodeficiency in adults	Sam Ahn, MD, Charlotte Cunningham-Rundles, MD, PhD
8	Periodic fever syndromes and other autoinflammatory diseases: An overview	Peter Nigrovic, MD
9	DiGeorge (22q11.2 deletion) syndrome: Clinical features and diagnosis	Christine Seroogy, MD
10	Primary humoral immunodeficiencies: An overview	Francisco Bonilla, MD, PhD
11	Periodic fever with aphthous stomatitis, pharyngitis and adenitis (PFAPA syndrome)	Shai Padeh, MD
12	Laboratory evaluation of the immune system	Francisco Bonilla, MD, PhD, E. Richard Stiehm, MD
13	Glucocorticoid effects on the immune system	W. Winn Chatham, MD
14	Chronic granulomatous disease: Pathogenesis, clinical manifestations, and diagnosis	Sergio Rosenzweig, MD, Steven Holland, MD
15	Selective IgA deficiency: Clinical manifestations, pathophysiology, and diagnosis	Robert Hostoffer, DO
16	Approach to the child with recurrent infections	E. Richard Stiehm, MD
17	Overview and clinical assessment of the complement system	M. Kathryn Liszewski, PhD, John Atkinson, MD
18	IgG subclass deficiency	Alan Knutsen, MD
19	Autosomal dominant hyperimmunoglobulin E syndrome	Timothy LaPine, MD, Attila Kumánovics, MD, Harry Hill, MD
20	Primary immunodeficiency: Overview of management	Francisco Bonilla, MD, PhD

Topics in bold text were not in the list of the 20 most-viewed topics by A/I specialists.

TABLE II. Immunology and immunodeficiency topics viewed most often in 2016 by A/I specialists who are UpToDate subscribers

Rank	Topic	Author(s)
1	Approach to the patient with unexplained eosinophilia	Peter Weller, MD, Amy Klion, MD
2	What's new in allergy and immunology	Anna Feldweg, MD, Elizabeth TePas, MD, MS
3	Overview of intravenous immune globulin (IVIG) therapy	Arthur Silvergleid, MD, Mark Ballow, MD
4	Eosinophil biology and causes of eosinophilia	Peter Weller, MD, Amy Klion, MD
5	Clinical manifestations, epidemiology, and diagnosis of common variable immunodeficiency in adults	Sam Ahn, MD, Charlotte Cunningham-Rundles, MD, PhD
6	Autosomal dominant hyperimmunoglobulin E syndrome	Timothy LaPine, MD, Attila Kumánovics, MD, Harry Hill, MD
7	Intravenous immune globulin: Adverse effects	Elena Perez, MD, PhD, Arthur Silvergleid, MD
8	Primary immunodeficiency: Overview of management	Francisco Bonilla, MD, PhD
9	Subcutaneous and intramuscular immune globulin therapy	Stephen Jolles, BSc Hons, MBChB Hons, MSc, PhD
10	Selective IgA deficiency: Clinical manifestations, pathophysiology, and diagnosis	Robert Hostoffer, DO
11	Primary humoral immunodeficiencies: An overview	Francisco Bonilla, MD, PhD
12	Laboratory evaluation of the immune system	Francisco Bonilla, MD, PhD, E. Richard Stiehm, MD
13	Periodic fever syndromes and other autoinflammatory diseases: An overview	Peter Nigrovic, MD
14	Treatment and prognosis of common variable immunodeficiency	Sam Ahn, MD, Charlotte Cunningham-Rundles, MD, PhD
15	Chronic granulomatous disease: Pathogenesis, clinical manifestations, and diagnosis	Sergio Rosenzweig, MD, Steven Holland, MD
16	Assessing the immunologic response to vaccination	Ricardo Sorensen, MD, Kenneth Paris, MD, MPH
17	Specific antibody deficiency	Ricardo Sorensen, MD, Kenneth Paris, MD, MPH
18	IgG subclass deficiency	Alan Knutsen, MD
19	Approach to the adult with recurrent infections	Mark Pasternack, MD
20	Approach to the child with recurrent infections	E. Richard Stiehm, MD

Topics in bold were not in the list of 20 most-viewed topics by all subscribers.

knowledge).³ The same study found that PubMed was also popular with physicians and was superior to UpToDate for identifying and researching a rare disease, although when both resources were used together, the information obtained was complementary, current, and comprehensive.

In conclusion, although clinical immunology and immunodeficiency is a small field, the content within UpToDate appears to have relevance to both generalists and specialists, particularly in the evaluation of common clinical presentations (eg, eosinophilia) and use of therapies that are used by multiple disciplines (eg, immune globulin). In addition, there is significant interest in evaluation and treatment of the more common PIDs, such as the antibody deficiency disorders.

^aDepartment of Pediatrics, Division of Allergy/Immunology/Rheumatology, David Geffen School of Medicine at UCLA, Los Angeles, Calif

^bUpToDate Inc, Waltham, Mass

^cHarvard Medical School, Boston, Mass

Conflicts of interest: E.R. Stiehm is on the Scientific Advisory Board of ADMA Biologics and a compensated external editor for UpToDate. E.C. TePas and A.M. Feldweg are Editorial Employees of UpToDate and are part-time faculty members of Harvard Medical School, Boston, Mass.

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Corresponding author: E. Richard Stiehm, MD, Department of Pediatrics, Rm 12-430 MDCC, UCLA Medical Center, 10860 LeConte Ave, Los Angeles, CA 90025. E-mail: estiehm@mednet.ucla.edu.

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