

# Shared decision-making, communicating risk, and food allergy in 2023

Marcus Shaker, M.D., M.S.<sup>1,2</sup>

## ABSTRACT

**Background:** Across the practice of allergy and clinical immunology, disruptive innovations have accelerated the adoption of shared decision-making (SDM) to improve the health of patients and populations, particularly with regard to food allergy prevention and management of food allergy and anaphylaxis.

**Methods:** A narrative review was performed to describe recent innovations in shared decision-making, risk communication, and food allergy.

**Results:** Several challenges, primarily related to the coronavirus disease 2019 (COVID-19) pandemic and misinformation campaigns, have catalyzed adaptations to evolve clinical care. Recent pressures have facilitated the rapid adoption of telemedicine. In 2023, many allergist/immunologists routinely incorporate both in-person and virtual visits to contextually deliver value-based care to each patient. SDM may occur in a hybrid model that incorporates both in-person and virtual encounters, with many patients experiencing benefit from a combination approach. This may be facilitated by leveraging previsit web-based SDM tools. Whether in person or by telemedicine, effective risk communication to avoid cognitive overload while appreciating population variation in numeracy is key to competent implementation of SDM. Misinformation continues to disproportionately harm patients who belong to groups that encourage denial of evidence-based medical recommendations and COVID-19 vaccination intent correlating with sociopolitical factors. Still, strategies to address misinformation that leverage empathy, respect, and expertise can help to mitigate these effects. Physician wellness is a key component to realization of the Quadruple Aim of health care, and the use of positive framing and appreciative inquiry can help to optimize outcomes and improve value in health care.

**Conclusion:** SDM is an important component to consider when incorporating recent innovations in allergy and clinical immunology care, particularly in the setting of contextual and conditional medical recommendations. Effective risk communication is critical to SDM that is truly reflective of patient goals and preferences, and can be facilitated through in-person encounters, telemedicine, and hybrid models. It is important to foster physician wellness as a component of the Quadruple Aim, particularly in the recent pandemic climate of misinformation and denial of evidence-based medicine within large groups of society.

(J Food Allergy 5:3–9, 2023; doi: 10.2500/jfa.2023.5.230001)

Shared decision-making (SDM) is a critical component to the practice of medicine in 2023, interwoven into patient interactions as deeply as any healing touch.<sup>1,2</sup> Allergist/immunologists are emerging as leaders in the use of SDM because, across the spectrum of allergic and immunologic diseases, many available

therapies require a patient preference-sensitive approach.<sup>3,4</sup> Whether a patient with primary immunodeficiency remains on intravenous immunoglobulin therapy or transitions to subcutaneous immunoglobulin infusions, whether a patient with mild asthma opts for the single maintenance and rescue therapy (SMART) approach, how an individual with allergic rhinitis prefers to manage his or her disease and if he or she begins subcutaneous or sublingual immunotherapy, and the approach to food allergen introduction in young infants with atopic dermatitis all involve SDM.<sup>1–3,5–9</sup> With the advent of food oral immunotherapy (OIT), SDM has taken an even more central role in food allergy management.<sup>10–13</sup>

The three conversations of SDM (team talk, option talk, and decision talk) require the ability to elicit and understand patient goals and preferences while contemporaneously and clearly communicating risks and benefits of each choice and engaging in preference-based (or preference-informed) decisions (Fig. 1).<sup>3,4</sup> However, risk communication is complex and influenced by multiple factors, including numeracy,

---

From the <sup>1</sup>Section of Allergy and Immunology, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire, and <sup>2</sup>Department of Medicine and Pediatrics, Dartmouth Geisel School of Medicine, Hanover, New Hampshire

M. Shaker has received research grants from DBV

Presented at the Eastern Food Allergy & Comorbidity Conference, January 6, 2023, Palm Beach, Florida

Funding provided by the Eastern Food Allergy & Comorbidity Conference

Address correspondence to Marcus Shaker, M.D., Section of Allergy and Immunology, Dartmouth-Hitchcock Medical Center, One Medical Center Drive, Lebanon, NH 03756

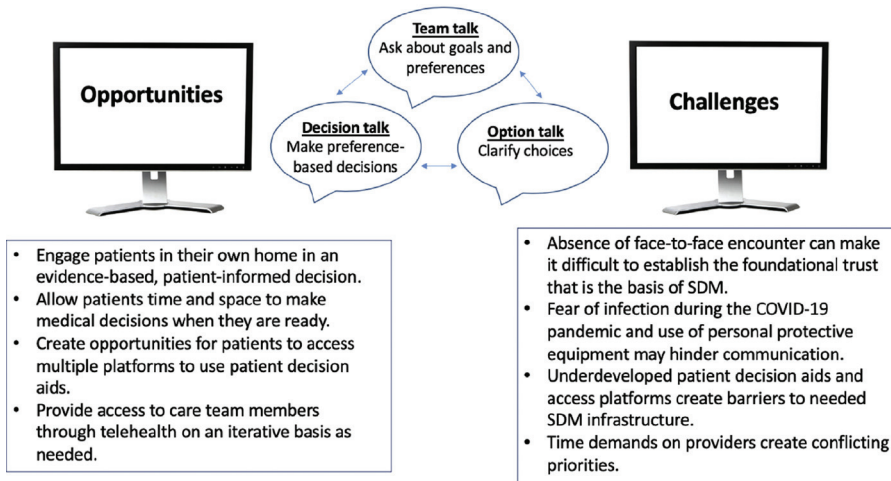
E-mail address: Marcus.shaker@dartmouth.edu

This article is distributed under the terms of the Creative Commons Attribution License-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0) license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits reproduction and redistribution in any medium or format according to the license terms, provided the work is not used for commercial purposes and provided the original authors and source are properly credited and a link is provided to the Creative Commons license. For commercial permissions, visit <https://oceansidepubl.com/permission-to-use-content/>

Copyright © 2023, The Author(s). Published by OceanSide Publications, Inc., U.S.A.

---

## Virtual Shared Decision Making



*Figure 1. Virtual shared decision-making (VSDM) creates opportunities and challenges. VSDM allows patient engagement in his or her own home, which can inform additional context that may not be available in a clinic setting. VSDM creates opportunities for access to information across multiple platforms. Reproduced with permission from Ref. 4.*

framing, cultural factors, health literacy, and personal experience.<sup>1,2</sup> Some conversational examples for how to begin to approach SDM within the context of food OIT are presented in Table 1.

The co-evolution of our understanding of SDM and risk communication with the coronavirus disease 2019 (COVID-19) pandemic has presented unique challenges and opportunities.<sup>4</sup> The most prominent example has been the rapid adoption of telemedicine. As rapidly as telemedicine has become a cornerstone of practice, the allergy community has also required resilience and innovation in addressing misinformation across the sociopolitical spectrum while promoting physician wellness in difficult times.<sup>14-16</sup>

This review will discuss how each of these seemingly disparate aspects of the daily practice of allergy and clinical immunology have been used by our specialty to inform and improve the value of care provided.

## HIGH VALUE CARE

The pandemic has led to an evolution in thinking to include an appreciation that quality does not live within a box but extends beyond our clinics.<sup>1</sup> The Institute of Medicine defines the following six domains of health care quality as follows<sup>17</sup>:

*Safe:* Avoiding harm from health care that is intended to help them.

*Effective:* Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).

*Patient-centered:* Providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions.

*Timely:* Reducing waits and sometimes harmful delays for those who receive and those who give care.

**Table 1 Example conversations in an SDM context in relation to food oral immunotherapy**

SDM Conversation	Example
Team talk	What is most important to you in living with food allergy? What are your hopes, what are your worries and concerns? How can you live your best life today and tomorrow with a food allergy?
Option talk	It is important to avoid accidental food reactions that we can prevent, and there are different ways to accomplish this goal. Taking advantage of early food introduction can help prevent food allergies, but when food allergies develop, some families are interested in active treatment, like food oral immunotherapy to decrease the risk of an accidental food reaction. However, in many patients, there is an increased risk of reactions from the food oral immunotherapy itself, at least in the short term.
Decision talk	What do you think would work best for you and your family? What questions do you have, and how can we best make a decision consistent with what matters most?

*SDM = Shared decision-making.*

*Efficient:* Avoiding waste, including waste of equipment supplies, ideas, and energy.

*Equitable:* Providing care that does not vary in quality because of personal characteristics, such as gender, geographic location, and socioeconomic status.

Abrams *et al.*<sup>1</sup> explored these dimensions of health-care quality in the context of the COVID-19 pandemic by using these domains as a lens in which to view which components of care might be considered “routine,” “essential,” and “exceptional.” Indeed, the Choosing Wisely campaign illustrated these concepts over a decade ago by providing notably durable advice (Table 2).<sup>18</sup> Key to informing any SDM is the understanding of how the level of evidence certainty informs practice and how evidence is translated into the clinic based on factors that include the balance between harms and benefits, patient values and preferences, resource allocation and cost-effectiveness, equity, feasibility, acceptability, and priority.<sup>1,3,4</sup> In the setting of high certainty evidence backed by a strong medical recommendation when benefits greatly outweigh harms, a clinical practice may be much less patient preference-sensitive than when evidence is less certain, and a recommendation is conditional.<sup>2,19</sup> Although increasingly less common, there are clearly many instances when SDM is not appropriate because medical care is not preference-sensitive in the setting of a strong recommendation (*e.g.*, use of epinephrine in the setting of severe anaphylaxis).<sup>19,20</sup> Still, the role of SDM seems increasingly prominent in most clinical interactions in which evidence is less certain and recommendations are conditional.<sup>3,4,19</sup>

## COMMUNICATING RISK

SDM assumes effective provider communication of risks and benefits, which can be represented by the concept of burden of disease to burden of therapy.<sup>2-4</sup> Patients and families require a clear understanding of the advantages and disadvantages of available options. While critical in any medical communication, risk communication is complex.<sup>2</sup> Medical encounters are often information-intense experiences, and, if cognitive overload occurs, then patients may not fully understand key details that are discussed.<sup>2</sup> Keeping messages as straightforward as possible while limiting superfluous content can improve understanding, and allowing individuals time to digest and process medical information can improve fidelity of patient preference-sensitive medical decisions.<sup>2,21</sup>

The ability to understand what numbers and statistics mean is variable across patients and populations, but, despite differences in numeracy, presenting numerical likelihoods of risk and benefits is often critical to the fully informed patient.<sup>2,21</sup> In these conversations, the differences between relative and absolute risks can create very different impressions.<sup>2,22</sup> For example, a therapy that increases the absolute risk of an adverse event from 0.1% to 0.2% may be perceived quite differently from one that changes this risk from 10% to 20%, although the relative risk increase of each is identical.<sup>22</sup> The nature of the adverse event is also central to the conversation. A decision may be more influenced by a significant risk of anaphylaxis than an adverse event of only isolated itching. In addition, it is important to use consistent time horizons, positive or negative framing, and anchoring to everyday hazards to improve risk

---

**Table 2 Choosing wisely: the American Academy of Allergy, Asthma & Immunology’s 10 things physicians and patients should question\***

---

- Don’t perform unproven diagnostic tests, such as immunoglobulin G (IgG) testing or an indiscriminate battery of immunoglobulin E (IgE) tests, in evaluation of allergy
  - Don’t order sinus computed tomography (CT) or indiscriminately prescribe antibiotics for uncomplicated acute rhinosinusitis
  - Don’t routinely do diagnostic testing in patients with chronic urticaria
  - Don’t recommend replacement immunoglobulin therapy for recurrent infections unless impaired antibody responses to vaccines are demonstrated
  - Don’t diagnose or manage asthma without spirometry
  - Don’t rely on antihistamines as first-line treatment in severe allergic reactions
  - Don’t perform food IgE testing without a history consistent with potential IgE-mediated allergy
  - Don’t routinely order low- or iso-osmolar radiocontrast media or pretreat with corticosteroids for patients with a history of seafood allergy who require radiocontrast media
  - Don’t routinely avoid influenza vaccination in egg allergic patients
  - Don’t overuse non-β lactam antibiotics in patients with a history of penicillin allergy, without an appropriate evaluation
- 

\*Adapted from Ref. 18.

---

communication.<sup>2</sup> The pictorial nature of decision aids helps to improve risk communication.

The psychology of risk perception can also relate to greater risk tolerance and risk taking in adolescents (particularly in regard to food allergy), whereas recency bias may influence the presentation of care options (e.g., advice from a provider with a strong recollection of a severe complication of a particular therapy).<sup>2</sup>

### Telemedicine and the COVID-19 Pandemic

Telemedicine has truly taken the experience of allergy care “out of the box” and beyond the walls of our clinics.<sup>4,14</sup> Benefits of telemedicine include limiting provider and patient exposure to COVID-19 and expanding access to rural locations.<sup>14,23</sup> While at the same time providing added convenience, decreased wait times, and lower out-of-pocket transportation costs, telemedicine has also created the undeniable situation in which Internet access has become a significant social determinant of health.<sup>23</sup> Barriers to effective use of telemedicine include health and technological literacy challenges and variations in how individual patients prefer to interact with health systems.<sup>4</sup> Some regulatory hurdles have been attenuated during the COVID-19 pandemic; however, the duration of current regulatory exceptions is unclear.<sup>4,23,24</sup>

Clinical outcomes for telemedicine across varied allergic and immunologic conditions are limited; however, this method of care delivery can be effective at improving asthma outcomes, particularly in the setting of a multimodal approach.<sup>25</sup> For example, in a systematic review and meta-analysis of asthma control and quality of life in adults, Chongmelaxme *et al.*<sup>26</sup> found evidence of significant benefit. In their review of 22 studies that included 10,281 participants, combined telemedicine approaches improved asthma control when compared with usual care (standard mean difference 0.78 [95% CI, 0.56-1.01]) for tele-case management) and quality of life (standard mean difference 0.27 [95% CI, 0.11-0.43] for tele-consultation).<sup>26</sup>

There is limited evidence that patients are satisfied with care provided by telemedicine.<sup>25,27</sup> In a prospective evaluation of 447 encounters (67.8% in person, 21.9% video, and 10.3% telephone) between June and July 2020, similar satisfaction was reported among in-person, video, and telephone encounters.<sup>27</sup> Parents and providers both reported that the use of telemedicine for future encounters should depend on the clinical situation.<sup>27</sup> This particular study was performed early in the pandemic, and, possibly as a result, in-person evaluations were more likely to be reported as

complete compared with both video and telephone visits by both patients and providers.<sup>27</sup>

### SDM in 2023

SDM in 2023 has continued to evolve, informed by the challenges and opportunities of the COVID-19 pandemic and the rapid expansion of telemedicine.<sup>3,4</sup> The framework of the three conversations of SDM has become embedded within telemedicine in some settings but often involves a hybrid approach of both in-person and telemedicine visits to facilitate the right care at the right time for each patient.<sup>3,4</sup> Translating this ongoing dialog to a virtual space creates unique opportunities and challenges (Figure 1). Virtual SDM (VSDM) creates its own opportunities and challenges.<sup>4</sup> VSDM allows patient engagement in the patient’s own home, which can inform additional context that may not be available in a clinic setting.<sup>4</sup> VSDM can allow access to information across multiple platforms, facilitates access to additional health-care team members, and engage family members and supports.<sup>4</sup> Still, it can be more difficult to establish the trusting, which is the foundation of the health care provider (HCP)-patient relationship.<sup>1,3,4</sup>

### Misinformation

Across sectors of society, it has become increasingly difficult to find consensus on objective truth.<sup>15,28</sup> Health-care communication is no exception to what has been described as an “infodemic,” characterized by quick access through multiple media channels to information of widely varying accuracy.<sup>4</sup> In the current sociopolitical environment, HCPs regularly encounter patients with strong health beliefs that may not be based in fact.<sup>28</sup> Factually inaccurate beliefs have been rampant during the COVID-19 pandemic and have led to vaccine hesitancy, vaccine refusal, and an increased burden of hospitalizations and deaths.<sup>29-33</sup> For example, in one study of 1427 individuals conducted in February 2021, a U.S. political party affiliation of Republican was associated with lower odds of COVID-19 vaccination intent (odds ratio 0.10 [95% CI, 0.05-0.19]). Individuals with high social trust and low perceived polarization had higher vaccine intent (odds ratio 2.39 [95% CI, 1.34-4.21]).<sup>34</sup>

Helpful strategies to address misinformation have recently been reviewed by Patrick *et al.*<sup>16</sup> Starting any dialog with empathy while expressing respect and politeness in speaking from a position of expertise and authority to explain science in clear language can be an effective approach to delivering recommendations and discussing true contraindications to therapies, which are backed by strong (nonconditional) recommendations (e.g., COVID-19 vaccination).<sup>16</sup> Patrick *et al.*<sup>16</sup> also highlight the importance of using anecdotes and



narratives to facilitate human connections and the need to focus on facts and not misinformation. Although acknowledging uncertainty and the role of SDM in contexts when recommendations are conditional and less certain, HCPs can use awareness of risk communication strategies to improve resource stewardship while mitigating misinformation, particularly for vulnerable populations and children.<sup>35,36</sup>

## Innovations

SDM can be especially helpful when discussing recent disruptive technology, which is characterized by those innovations that significantly alter usual approaches to care to improve health care delivery but for which recommendations may be more conditional.<sup>19,37</sup> Examples of such novel approaches include use of SMART, home management of anaphylaxis, early food introduction strategies, and food OIT.<sup>38</sup> Although not related to food allergy, SMART management of patients with mild asthma is one such advance.<sup>38</sup> Whether or not further improvements will be realized through replacement of over-the-counter inhaled epinephrine with a SMART device is an intriguing proposition, although there is evidence that such an approach could prevent thousands of deaths, prevent > 10 million severe asthma exacerbations, and save billions of dollars.<sup>39,40</sup>

Food allergy diagnosis and management have advanced rapidly in recent years.<sup>41</sup> In 2021, a consensus approach to the primary prevention of food allergy through nutrition was published, which provided guidance from the American Academy of Allergy, Asthma & Immunology, the American College of Allergy, Asthma, and Immunology, and the Canadian Society for Allergy and Clinical Immunology.<sup>42</sup> A key advancement in this guidance is the use of SDM to leverage timing of early food introduction for all infants naive to the potential food allergen being introduced, including those infants with severe eczema considered to have a higher risk for food allergy development.<sup>42,43</sup> Importantly, screening testing before infant food introduction is not required.<sup>42</sup> For families with high anxiety, consideration can be given to introducing very small amounts of a potential food allergen (*e.g.*, peanut butter powder). Approaches for early food introduction without screening make health and economic sense, with the ability to reduce costs and improve quality adjusted life years.<sup>38,43–48</sup>

Food allergen immunotherapy has emerged as a patient preference-sensitive option that holds promise for patient empowerment and improved quality of life.<sup>6,49–52</sup> There is evidence that peanut OIT (POIT) and epicutaneous immunotherapy may be cost-effective options for children with peanut allergy with ceiling value-based costs between \$1235–\$5235 for POIT

and \$1568–\$6568 for epicutaneous immunotherapy.<sup>53</sup> Furthermore, there is evidence from real-world practice that preschool POIT could save up to 47 billion dollars in the United States while preventing episodes of anaphylaxis and fatal peanut-associated allergic reactions.<sup>53</sup> These impressive health and economic outcomes result from a high rate of successful low-cost POIT when initiated in young children.<sup>11,53–55</sup>

Home management of resolved anaphylaxis is a strategy that makes intuitive sense to many HCPs and patients when the low rate of biphasic anaphylaxis is considered, particularly in patients with nonsevere resolved allergic reactions who have received prompt treatment with epinephrine.<sup>56,57</sup> There is evidence that biphasic anaphylaxis is unlikely in patients with community anaphylaxis, with one recent meta-analysis describing a rate of 3.92% (95% CI, 2.88%–5.32%).<sup>58</sup> Similarly, data from an 11-country anaphylaxis registry that included 8736 patients revealed a biphasic anaphylaxis rate of 4.7% (95%, 4.3% - 5.2%).<sup>59</sup> With such low rates of biphasic anaphylaxis, it is not surprising that reflex use of emergency medical services for all patients with resolved allergic reactions after epinephrine is not a cost-effective practice; however, it remains important for patients to seek medical care for further treatment if signs and symptoms of anaphylaxis do not promptly resolve after community epinephrine.<sup>60</sup> The incremental cost of reflex emergency medical services activation approaches 1.3 billion U.S. dollars per death prevented.<sup>60</sup>

Across recent innovations, SDM provides the platform clinicians and patients need to explore patient goals and preferences, and clarify available management options to facilitate preference-informed decisions.<sup>3,4</sup>

## Physician Wellness

The Quadruple Aim of health care is directed toward the aspirational goal of improving (i) the patient experience and (ii) the health of populations while (iii) reducing the cost of care and (iv) facilitating HCP wellness and preventing burnout.<sup>61</sup> Dimensions of wellness include emotional, spiritual, intellectual, social, physical, environmental, financial, and occupational dimensions.<sup>62</sup> The classic features of burnout include exhaustion, feeling a lack of personal accomplishment, and depersonalization.<sup>62</sup> These symptoms are not uncommon. In a survey of the American Academy of Allergy, Asthma & Immunology membership, 35% of respondents reported burnout.<sup>63</sup> Although this survey was only able to report on the 138 fellows and members who responded to the survey (13% response rate), these numbers do indicate the importance of addressing risk factors for burnout.<sup>63</sup> Stresses that lead to burnout may result from time and financial pressures

as well as feelings of inadequacy in the ability to meet the needs of patients and provide them idealized but infeasible outcomes.<sup>62</sup> Still, developing a habit of reviewing, acknowledging, and releasing fears, anger, and resentments and practicing forgiveness (of ourselves and others) can lead to improvement in the dimensions of wellness.<sup>62</sup> The use of appreciative inquiry and a strength-focused and meaning-oriented approach can result in practice improvement through building on gratitude and strengths with less of a focus on weakness and resentment.<sup>64</sup> This approach can lead to a positive mindset characterized by openness and creativity to allow HCPs to engage with patients to improve the delivery of health care in patient preference-sensitive contexts, be it in person, virtual, using a web-based SDM tool, or a combination of these modalities.<sup>64</sup>

## CONCLUSION

By leveraging SDM in the setting of recent innovations, HCPs can facilitate high value care. In the current climate of health-care communication, traditional approaches to risk communication must navigate misinformation and adverse consequences of the infodemic to provide the right care, at the right time, in the right setting, be it in person, virtual, or a combination of each. The Quadruple Aim of health care continues to provide a roadmap for best practice while acknowledging the importance of wellness to both patients and HCPs. Using both traditional and novel approaches to care can enable clinicians to meet future challenges and allow us each to “stand by the good and make it better when we can.”<sup>36</sup>

## REFERENCES

- Abrams EM, Singer AG, Shaker M, et al. What the COVID-19 pandemic can teach us about resource stewardship and quality in health care. *J Allergy Clin Immunol Pract.* 2021; 9:608–612.
- Shaker M, Hsu Blatman K, Abrams EM. Engaging patient partners in state-of-the-art allergy care: finding balance when discussing risk. *Ann Allergy Asthma Immunol.* 2020; 125:252–261.
- Blaiss MS, Steven GC, Bender B, et al. Shared decision making for the allergist. *Ann Allergy Asthma Immunol.* 2019; 122:463–470.
- Abrams EM, Shaker M, Oppenheimer J, et al. The challenges and opportunities for shared decision making highlighted by COVID-19. *J Allergy Clin Immunol Pract.* 2020; 8:2474–2480.e1.
- Abrams EM, Shaker M, Greenhawt M, et al. Treatment of mild-to-moderate asthma in childhood and adolescence in 2021. *Lancet Respir Med.* 2021; 9:443–445.
- Wasserman RL, Factor J, Windom HH, et al. An approach to the office-based practice of food oral immunotherapy. *J Allergy Clin Immunol Pract.* 2021; 9:1826–1838.e8.
- Greenhawt M, Abrams EM, Oppenheimer J, et al. The COVID-19 pandemic in 2021: avoiding overdiagnosis of anaphylaxis risk while safely vaccinating the world. *J Allergy Clin Immunol Pract.* 2021; 9:1438–1441.
- Mack DP, Chan ES, Shaker M, et al. Novel approaches to food allergy management during COVID-19 inspire long-term change. *J Allergy Clin Immunol Pract.* 2020; 8:2851–2857.
- Gonzalez JM, Ballow M, Fairchild A, et al. Primary immune deficiency: patients’ preferences for replacement immunoglobulin therapy. *Front Immunol.* 2022; 13:827305.
- Shaker M, Abrams EM, Greenhawt M. Clinician adoption of US peanut introduction guidelines—a case for conditional recommendations and contextual considerations to empower shared decision-making. *JAMA Netw Open.* 2020; 3:e2011535.
- Chua GT, Greenhawt M, Shaker M, et al. The case for prompt salvage infant peanut oral immunotherapy following failed primary prevention. *J Allergy Clin Immunol Pract.* 2022; 10:2561–2569.
- Abrams EM, Shaker M, Greenhawt M, et al. International peanut allergy prevention, 6 years after the learning early about peanut study. *J Allergy Clin Immunol Pract.* 2022; 10:71–77.
- Greenhawt M, Oppenheimer J, Abrams EM, et al. Leveraging shared decision making to discuss nonessential medical testing and prevent peanut allergy overdiagnosis during infancy. *J Allergy Clin Immunol.* 2021; 148:272–273.
- Hare N, Bansal P, Bajowala SS, et al. Work group report: COVID-19: unmasking telemedicine. *J Allergy Clin Immunol Pract.* 2020; 8:2461–2473.e3.
- Stukus DR. Tackling medical misinformation in allergy and immunology practice. *Expert Rev Clin Immunol.* 2022; 18:995–996.
- Patrick M, Venkatesh RD, Stukus DR. Social media and its impact on health care. *Ann Allergy Asthma Immunol.* 2022; 128:139–145.
- Agency for Healthcare Research and Quality. Six domains of healthcare quality. Available online at <https://www.ahrq.gov/talkingquality/measures/six-domains.html>; accessed December 24, 2022.
- American Academy of Allergy. Asthma & Immunology. Choosing Wisely. Available online at <https://www.choosingwisely.org/societies/american-academy-of-allergy-asthma-immunology/>; accessed December 24, 2022.
- Shaker MS, Oppenheimer J, Wallace DV, et al. Making the GRADE in anaphylaxis management: toward recommendations integrating values, preferences, context, and shared decision making. *Ann Allergy Asthma Immunol.* 2020; 124:526–535.e2.
- Shaker MS, Wallace DV, Golden DBK, et al. Anaphylaxis—a 2020 practice parameter update, systematic review, and Grading of Recommendations, Assessment, Development and Evaluation (GRADE) analysis. *J Allergy Clin Immunol.* 2020; 145:1082–1123.
- Peters E, Dieckmann N, Dixon A, et al. Less is more in presenting quality information to consumers. *Med Care Res Rev.* 2007; 64:169–190.
- Lipkus IM, Samsa G, Rimer BK. General performance on a numeracy scale among highly educated samples. *Med Decis Making.* 2001; 21:37–44.
- Rehman N, Portnoy J, Wu AC. Could telemedicine be here to stay? Understanding the rapidly changing landscape of telemedicine in allergy and immunology practice. *J Allergy Clin Immunol Pract.* 2022; 10:2550–2551.
- Justvig SP, Haynes L, Karpowicz K, et al. The role of social determinants of health in the use of telemedicine for asthma in children. *J Allergy Clin Immunol Pract.* 2022; 10:2543–2549.
- Ramsey A, Mustafa SS, Portnoy JM. Patient and clinician attitudes toward telemedicine for allergy and immunology. *J Allergy Clin Immunol Pract.* 2022; 10:2493–2499.
- Chongmelaxme B, Lee S, Dhippayom T, et al. The effects of telemedicine on asthma control and patients’ quality of life in adults: a systematic review and meta-analysis. *J Allergy Clin Immunol Pract.* 2019; 7:199–216.e11.
- Mustafa SS, Yang L, Mortezaei M, et al. Patient satisfaction with telemedicine encounters in an allergy and immunology practice during the coronavirus disease 2019 pandemic. *Ann Allergy Asthma Immunol.* 2020; 125:478–479.

28. Pierri F, Perry BL, DeVerna MR, et al. Online misinformation is linked to early COVID-19 vaccination hesitancy and refusal. *Sci Rep.* 2022; 12:5966.
29. Farrenkopf PM. The cost of ignoring vaccines. *Yale J Biol Med.* 2022; 95:265–269.
30. Leon TM, Dorabawila V, Nelson L, et al. COVID-19 cases and hospitalizations by COVID-19 vaccination status and previous COVID-19 diagnosis - California and New York, May–November 2021. *MMWR Morb Mortal Wkly Rep.* 2022; 71:125–131.
31. Ojea Quintana I, Reimann R, Cheong M, et al. Polarization and trust in the evolution of vaccine discourse on Twitter during COVID-19. *PLoS One* 2022; 17:e0277292.
32. Howard MC. Investigating the relation of political orientation and vaccination outcomes: identifying the roles of political ideology, party affiliation, and vaccine hesitancy. *Psychol Rep.* 2022;332941221144604.
33. Klinkhammer KE, Romm KF, Kerrigan D, et al. Sociopolitical, mental health, and sociodemographic correlates of COVID-19 vaccine hesitancy among young adults in 6 US metropolitan areas. *Prev Med Rep.* 2022; 27:101812.
34. Dolman AJ, Fraser T, Panagopoulos C, et al. Opposing views: associations of political polarization, political party affiliation, and social trust with COVID-19 vaccination intent and receipt. *J Public Health (Oxf).* 2022.
35. Abrams EM, Greenhawt M, Shaker M, et al. The COVID-19 pandemic: adverse effects on the social determinants of health in children and families. *Ann Allergy Asthma Immunol.* 2022; 128:19–25.
36. Abrams EM, Singer AG, Greenhawt M, et al. Ten tips for improving your clinical practice during the COVID-19 pandemic. *Curr Opin Pediatr.* 2021; 33:260–267.
37. Perleth M, Di Bidino R, Huang L-Y, et al. Disruptive technologies in health care disenchanting: a systematic review of concepts and examples. *Int J Technol Assess Health Care.* 2022; 38:e70.
38. Shaker M, Mauger D, Fuhlbrigge AL. Value-based, cost-effective care: the role of the allergist-immunologist. *J Allergy Clin Immunol Pract.* 2023; 11:132–139.
39. Feldman WB, Avorn J, Kesselheim AS. Switching to over-the-counter availability of rescue inhalers for asthma. *JAMA.* 2022; 327:1021–1022.
40. Khoa J, Shaker M, Greenhawt M, et al. Cost-effectiveness of over-the-counter as-needed budesonide-formoterol versus inhaled epinephrine in US adults with mild asthma. Submitted for publication 2023.
41. Greenhawt M, Shaker M, Wang J, et al. Peanut allergy diagnosis: a 2020 practice parameter update, systematic review, and GRADE analysis. *J Allergy Clin Immunol.* 2020; 146:1302–1334.
42. Fleischer DM, Chan ES, Venter C, et al. A consensus approach to the primary prevention of food allergy through nutrition: guidance from the American Academy of Allergy, Asthma, and Immunology; American College of Allergy, Asthma, and Immunology; and the Canadian Society for Allergy and Clinical Immunology. *J Allergy Clin Immunol Pract.* 2021; 9:22–43.e4.
43. Yuan I, Greenhawt M, Shaker M. An update on international practice variation in peanut introduction: conundrums, controversies, and a new direction. *Curr Opin Pediatr.* 2020; 32:825–831.
44. Shaker M, Greenhawt M. Providing cost-effective care for food allergy. *Ann Allergy Asthma Immunol.* 2019; 123:240–248.e1.
45. Shaker M, Verma K, Greenhawt M. The health and economic outcomes of early egg introduction strategies. *Allergy.* 2018; 73:2214–2223.
46. Shaker M, Stukus D, Chan ES, et al. To screen or not to screen?: comparing the health and economic benefits of early peanut introduction strategies in five countries. *Allergy.* 2018; 73:1707–1714.
47. Greenhawt M, Shaker M. Determining levers of cost-effectiveness for screening infants at high risk for peanut sensitization before early peanut introduction. *JAMA Netw Open.* 2019; 2:e1918041.
48. Shaker MS, Iglesia E, Greenhawt M. The health and economic benefits of approaches for peanut introduction in infants with a peanut allergic sibling. *Allergy.* 2019; 74:2251–2254.
49. Factor JM, Mendelson L, Lee J, et al. Effect of oral immunotherapy to peanut on food-specific quality of life. *Ann Allergy Asthma Immunol.* 2012; 109:348–352.e2.
50. Warren CM, Gupta RS, Sohn M-W, et al. Differences in empowerment and quality of life among parents of children with food allergy. *Ann Allergy Asthma Immunol.* 2015; 114:117–125.
51. Begin P, Chan ES, Kim H, et al. CSACI guidelines for the ethical, evidence-based and patient-oriented clinical practice of oral immunotherapy in IgE-mediated food allergy. *Allergy Asthma Clin Immunol.* 2020; 16:20.
52. Mack DP, Greenhawt M, Turner PJ, et al. Information needs of patients considering oral immunotherapy for food allergy. *Clin Exp Allergy.* 2022; 52:1391–1402.
53. Shaker M, Greenhawt M. Estimation of health and economic benefits of commercial peanut immunotherapy products: a cost-effectiveness analysis. *JAMA Netw Open.* 2019; 2:e193242.
54. Soller L, Carr S, Kapur S, et al. Real-world peanut OIT in infants may be safer than non-infant preschool OIT and equally effective. *J Allergy Clin Immunol Pract.* 2022; 10:1113–1116.e1.
55. Soller L, Abrams EM, Carr S, et al. First real-world effectiveness analysis of preschool peanut oral immunotherapy. *J Allergy Clin Immunol Pract.* 2021; 9:1349–1356.e1.
56. Casale TB, Wang J, Oppenheimer J, et al. Acute at-home management of anaphylaxis: 911: what is the emergency? *J Allergy Clin Immunol Pract.* 2022; 10:2274–2279.
57. Casale TB, Wang J, Nowak-Wegrzyn A. Acute at home management of anaphylaxis during the Covid-19 pandemic. *J Allergy Clin Immunol Pract.* 2020; 8:1795–1797.
58. Miles LM, Ratnarajah K, Gabrielli S, et al. Community use of epinephrine for the treatment of anaphylaxis: a review and meta-analysis. *J Allergy Clin Immunol Pract.* 2021; 9:2321–2333.
59. Kraft M, Scherer Hofmeier K, Rueff F, et al. Risk factors and characteristics of biphasic anaphylaxis. *J Allergy Clin Immunol Pract.* 2020; 8:3388–3395.e6.
60. Shaker M, Kanaoka T, Feenan L, et al. An economic evaluation of immediate vs non-immediate activation of emergency medical services after epinephrine use for peanut-induced anaphylaxis. *Ann Allergy Asthma Immunol.* 2019; 122:79–85.
61. Iglesia EGA, Greenhawt M, Shaker MS. Achieving the Quadruple Aim to deliver value-based allergy care in an ever-evolving health care system. *Ann Allergy Asthma Immunol.* 2020; 125:126–136.
62. Shaker M. Preventing burnout through wellness and an attitude of gratitude. *Ann Allergy Asthma Immunol.* 2021; 126:215–216.
63. Bingemann T, Sharma H, Nanda A, et al. AAAAI Work Group Report: physician wellness in allergy and immunology. *J Allergy Clin Immunol Pract.* 2020; 8:1224–1229.
64. Bansal P, Bingemann TA, Greenhawt M, et al. Clinician wellness during the COVID-19 pandemic: extraordinary times and unusual challenges for the allergist/immunologist. *J Allergy Clin Immunol Pract.* 2020; 8:1781–1790.e3. □