Web-based Infant Food Introduction (WIFI): Feasibility and satisfaction of virtual allergist-supervised food introduction

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Clinical Implications

- The coronavirus disease 2019 (COVID-19) pandemic has limited access to in-person allergist assessments. Virtually supported food introduction can be a feasible and safe approach to avoid delays in high-risk individuals, supported by positive experience and high satisfaction rates for both caregivers and allergists.

The coronavirus disease 2019 (COVID-19) pandemic has resulted in the modification and postponement of many allergy clinic services.[1,2] As a result, effective implementation of food allergy prevention poses a challenge, particularly in high-risk infants and families requiring support from health care providers for early introduction of allergenic foods.[3] This may, in turn, increase the risk of developing a potentially preventable allergy with recent and emerging literature advocating for a more liberal food introduction in infants.[4-6] The feasibility of virtually supported home peanut introduction was recently demonstrated through a case series.[7] Families interacted with the clinician at the beginning of the encounter and throughout the procedure, which was not burdensome to the physician and was appreciated by caregivers. However, the virtually supported encounters were limited to peanut introduction, and little is known regarding feasibility and satisfaction of allergists and caregivers during this process. Many countries are currently experiencing second and third waves of COVID-19, and virtually supported care is becoming increasingly important because in-person allergy services continue to be delayed. We performed a Canada-wide multicenter quality improvement initiative to further assess the safety and feasibility of virtually supported introduction of any allergenic food in high-risk infants. In addition, we explored both allergist and caregiver satisfaction of the virtually supported food introduction.

Infants (≤24 months) meeting our definition of high risk for development of food allergy (Figure E1, available in this article's Online Repository at www.jaci-inpractice.org) underwent virtually supported oral introduction to allergenic foods. Visits were held via secure telehealth platforms. An initial assessment of the child's health was performed prior to the virtually supported food introduction. Caregivers were counselled about the low risk of anaphylaxis at first ingestion, provided with food preparation instructions, and asked to obtain an epinephrine autoinjector (ideally 2) and nonsedating antihistamines (Figure E1, *B*). On the second visit, caregivers were instructed to feed their child increasing amounts of the chosen food every 10 to 15 minutes (as tolerated) over a period of 45 to 60 minutes. The target dose of allergenic food protein was 2 g or an age-appropriate serving size.[7] During this process, the allergist was available at all times to assist caregivers virtually in the event of a reaction. Surveys were given to caregivers before and after the virtual encounter to evaluate their satisfaction with virtually supported food introduction measured on a numerical scale from 1 to 100 as well as to assess potential reasons for food introduction hesitancy. Surveys were given to allergists following the encounter to document outcome of the procedure and to evaluate their satisfaction with virtually supported food introduction measured on a numerical scale from 1 to 100. The University of British Columbia/BC Children's Hospital Research Ethics Board waives quality improvement projects from formal Research Ethics Board application processes.

Between May 14 and October 31, 2020, 40 infants underwent virtually supported food introduction. 28 of 40 participants completed the baseline survey; the median age of the child was 9 months (interquartile range 7-11 months), and 12 infants (43%) had preexisting food allergies, 83% of which had been diagnosed by a pediatric allergist (Table I). The most frequent reasons for food introduction hesitancy were fear of a potential allergic reaction (57%; n = 16) and an existing food allergy in the child (39%; n = 11). Caregivers were most hesitant to introduce tree nuts (46%; n = 13), shellfish (46%; n = 13), and peanuts (36%; n = 10), with many caregivers concerned about introducing multiple foods.

Allergists completed postvisit surveys on 40 patients who underwent virtually supported allergenic food introductions, of whom 32 (75%) had a history of eczema. The most common foods introduced through the virtual encounter were peanuts (50%; n = 20) followed by tree nuts (40%; n = 16). Thirty-five patients (88%) passed the virtually supported food introduction, and 5 patients (13%) had a reaction during the virtually supported food introduction, with 1 patient requiring 1 dose of epinephrine. Of the 5 patients who reacted, 3 (60%) reacted to peanut. Four (80%) had a history of eczema, and 3 (60%) had completed skin prick testing before virtually supported food introduction. Out of the 20 virtually supported peanut introductions, 15 patients (75%) were less than 12 months of age and considered at high risk of developing peanut allergy based on the National Institute of Allergy and Infectious Diseases (NIAID) guidelines on early allergenic food introduction.[8] In this infant group, 8 (53%) had egg allergy, 11 (73%) had eczema, and 7 (47%) had both eczema and egg allergy. Only 1 infant in this group had a reaction during the virtually supported peanut introduction. This patient did not have prior skin prick testing and only had a mild reaction

TABLE I. Patient demographics and allergist-reported patient characteristics (n = 28)

Demographics and characteristics	Value
Age, months	
Median	9 mo (IQR 7-11 mo)
Range	5-18 mo
Gender, n (%)	
Male	16 (57)
Female	11 (39)
Prefer not to answer	1 (4)
Caregiver reported food allergy diagnosis (can select >1 option), n (%)	12 (43)
Egg	8 (67)
Peanut	6 (50)
Tree nuts	4 (33)
Sesame	2 (17)
Milk	1 (8)
Other	1 (8)
Wheat	0 (0)
Soy	0 (0)
Fish	0 (0)
Shellfish	0 (0)
Allergist-reported patient characteristics (n = 40), n (%)	
History of food allergy in patient	29 (73)
History of food allergy in sibling	8 (20)
History of food allergy in parent	8 (20)
History of anaphylaxis	4 (10)
History of eczema	32 (80)
Median severity of eczema (1-10) (n = 32)	2.5
History of asthma	2 (60)
Family history of atopy (defined as asthma, eczema, food allergies and/or allergic rhinitis)	36 (90)
Prior skin testing to food being introduced	3 (8)
Prior sIgE blood testing to food being introduced	2 (5)

IQR, Interquartile range; *sIgE,* serum immunoglobulin E.

TABLE II. Characteristics of virtually supported food introduction

Allergist responses (n = 40)	n (%)
Foods introduced	
Peanut	20 (50)
Tree nuts	16 (40)
Almond	8 (20)
Cashew	1 (5)
Hazelnut	5 (13)
Walnut	2 (5)
Baked eggs	1 (3)
Baked milk	1 (3)
Shellfish	1 (3)
Coconut	1 (3)
Food introduction results, n (%)	
Successful introduction	35 (88)
Would continue to offer virtually supported food introduction when in-person visits are fully available	39 (98)
Median allergist satisfaction score (1-100)	99
Median caregiver satisfaction score (n = 18), (1-100)	99

Caregiver-reported responses (n = 18), n (%)	Baseline	Postvisit
Confidence in introducing allergenic foods to infant		
No confidence	0 (0)	1 (5.5)
Little confidence	3 (17)	0 (0)
Somewhat confident	11 (61)	4 (22)
Confident	2 (11)	10 (56)
Very confident	2 (11)	3 (17)
Confidence in ability to recognize a reaction		
No confidence	0 (0)	0 (0)
Little confidence	1 (6)	0 (0)
Somewhat confident	5 (28)	4 (22)
Confident	8 (44)	8 (44)
Very confident	4 (22)	6 (33)
Confidence in ability to treat a reaction		
No confidence	0 (0)	0 (0)
Little confidence	3 (17)	0 (0)
Somewhat confident	9 (50)	6 (33)
Confident	3 (17)	8 (44)
Very confident	3 (17)	4 (22)

during virtually supported food introduction requiring no treatment (Table E1; available in this article's Online Repository at www.jaci-inpractice.org).

A total of 18 of 28 caregivers completed the postvisit survey. Compared with the baseline surveys, the postvisit surveys demonstrated that the caregivers had increased confidence in introducing allergenic foods, recognizing signs and symptoms of allergic reactions, and treating allergic reactions (Table II). Following the virtual encounter, 12 caregivers (67%) planned to introduce new foods to their infant that they otherwise would not have, with tree nuts most likely to be introduced (67%; n = 12). The median caregiver satisfaction of virtually supported food introduction was 99 of 100, with 15 caregivers (83%) opting into this method in the future if it meant shorter wait times. The median allergist satisfaction score of virtually supported food introduction was 99 of 100 on a satisfaction scale, and 98% (n = 39) stated they would continue to offer virtually supported food introduction even when in-person visits become fully available.

Our quality improvement initiative demonstrated the safety and feasibility of virtual food introduction in high-risk infants, with caregivers and allergists reporting high levels of satisfaction. A small sample size is a limitation of this initiative, but we have provided proof of concept in the context of the current pandemic where improving access to care is important for high-risk infants in a critical window of time in which food introduction can help prevent the development of food allergies.[3,6-8] Virtual care allows flexibility from the perspective of patients and their families, minimizing travel and improving access to patients living in remote communities. Virtual care also allows procedures to be performed in a more comfortable, familiar, and relaxing environment for the patient and caregiver. In addition, virtual care can minimize the risk of acquiring COVID-19, reduce unnecessary patient backlog, and reduce long-term cost to the health care system. Virtually supported food introduction is an innovative and practical method

for food introduction, which should be encouraged both during the COVID-19 pandemic and beyond.

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Conflicts of interest: D. P. Mack has provided consultation and speaker services for Pfizer, Aimmune, Kaleo, Merck, Covis and Pediapharm; has been part of an advisory board for Pfizer and Bausch Health; and sits on the editorial board for the *Journal of Food Allergy*. L. Soller participates in research with DBV Technologies. E. S. Chan has received research support from DBV Technologies; has been a member of advisory boards for Pfizer, Pediapharm, Leo Pharma, Kaleo, DBV, AllerGenis, Sanofi Genzyme, Bausch Health, and Avir Pharma; is a member of the health care advisory board for Food Allergy Canada; was an expert panel and coordinating committee member of the National Institute of Allergy and Infectious Diseases (NIAID)−sponsored Guidelines for Peanut Allergy Prevention; and was colead of the Canadian Society of Allergy and Clinical Immunology (CSACI) oral immunotherapy guidelines. S. Jeimy has been on speaker's bureaus for Aralez, AstraZeneca, Sanofi, and Novartis. M. Hanna has provided speaker services for Pfizer and Pediapharm. E. M. Abrams is on the National Advisory Committee for Food Allergy Canada. S. B. Cameron has been a member of advisory boards for Bausch Health, and Pfizer; and was a committee member of the CSACI oral immunotherapy guidelines. V. E. Cook has been a member of advisory boards for Sanofi Genzyme, Bausch Health, and ALK; and has provided speaker services for Aralez Pharmaceuticals and CSL Behring. J. L. P. Protudjer sits on the steering committee of Canada's National Food Allergy Action Plan; and is Section Head, Allied Health, of the CSACI. T. Wong has provided speaking engagements for Pfizer and Stallergenes-Greer; and has been part of an advisory board for Leo Pharma and ALK. The rest of the authors declare that they have no relevant conflicts of interest.

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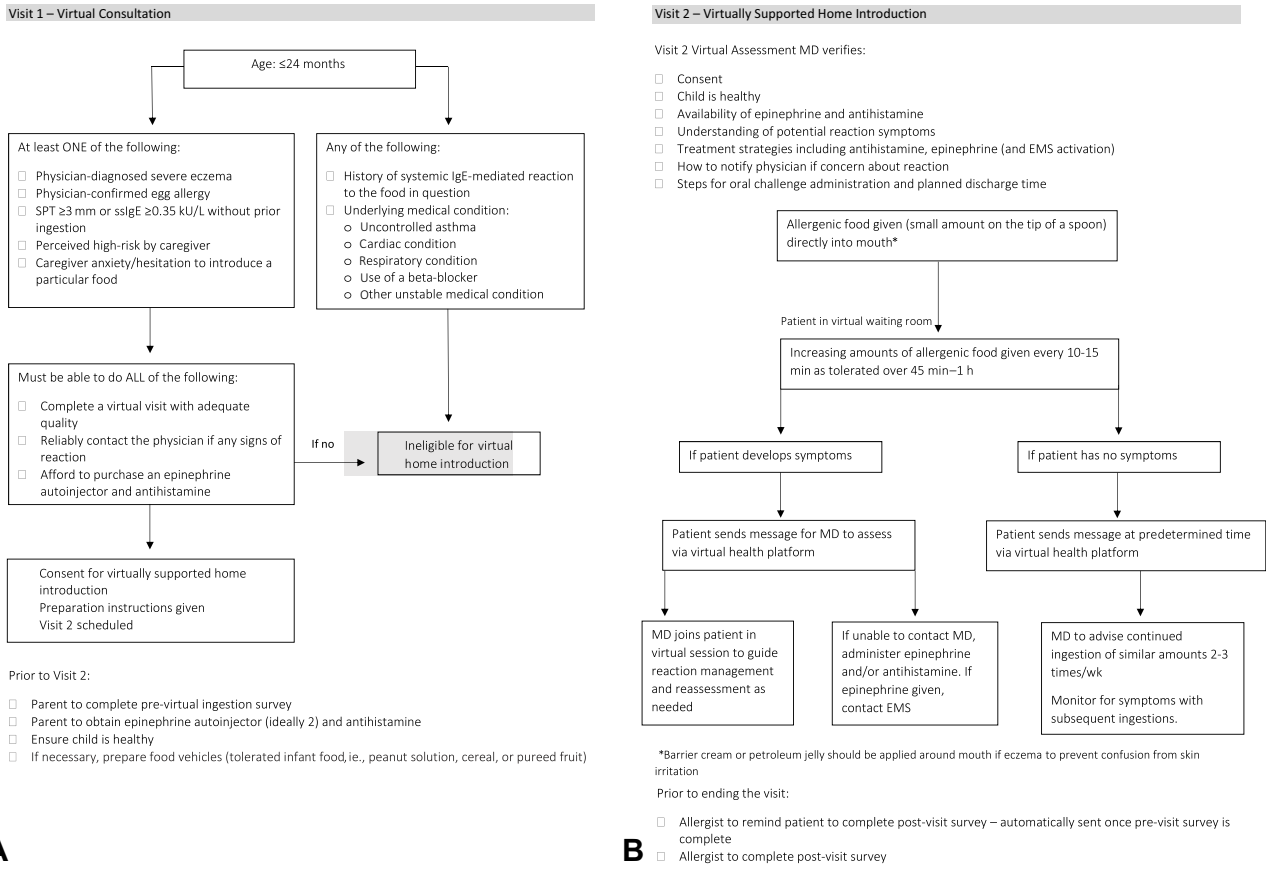

FIGURE E1. Selection criteria and visit procedure for virtually supported food introduction in at-risk infants. (**A**) At-risk infant selection criteria. (**B**) Virtually supported food introduction procedure. (Modified and adapted from Mack DP, Hanna MA, Abrams EM, Wong T, Soller L, Erdle SC, et al. Virtually supported home peanut introduction during COVID-19 for at-risk infants. J Allergy Clin Immunol Pract 2020;8:2780-3.) *EMS,* Emergency medical services; *MD,* medical doctor; *SPT,* skin prick testing; *sslgE,* serum-specific immunoglobulin E.

TABLE E1. Reactions during virtually supported food introduction

Foods that elicited reaction	Age (mo)	History of eczema	Skin test results, if available (wheal size, mm)	Symptom(s)	Treatment(s)	Recommendation
Almond	18	Yes	≥3	Urticaria/emesis	Antihistamines	Food avoidance
Hazelnut	11	Yes	≥3	Urticaria	Observation	Food oral immunotherapy
Peanut	17	No	<3	Emesis	Observation	Food avoidance
Peanut	11	Yes	Not done	Urticaria	Observation	Food oral immunotherapy
Peanut	14	Yes	Not done	Urticaria/lethargy	Epinephrine administration/ED visit	Food oral immunotherapy

ED, Emergency department.