

TeleAllergy: Potential of telemedicine in management of patients with allergies

Hanna Lindemann, Emil Hammer, Luca Bonifacio, Christian Greis, Karin Hartmann

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Table of Contents

Original Manuscript..... 5

Supplementary Files..... 27

 Figures 28

 Figure 1..... 29

 Figure 2..... 30

 Figure 3..... 31

TeleAllergy: Potential of telemedicine in management of patients with allergies

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Abstract

Background: The growing prevalence of allergic diseases, alongside a shortage of trained allergists, creates significant challenges in delivering timely care, especially for underserved populations. Telemedicine presents a promising solution, offering remote care through digital tools. While telemedicine has been widely adopted in other fields, its use in allergy care remains underexplored.

Objective: This study aims to assess the potential of telemedicine in managing allergic diseases by examining patient preferences and experiences.

Methods: A survey of 27 questions was distributed to adult patients (over 18 years) with allergic diseases attending the outpatient allergy clinic at the Division of Allergy, University Hospital Basel, Basel, Switzerland, between May and August 2024. The survey covered demographic information, prior use of telemedicine, and preferences for teleconsultation modalities. It also assessed patients' willingness to share various types of clinical data, including images and written reports, and explored which allergic diseases were considered appropriate for telemedicine.

Results: A total of 102 patients participated in the survey, with a mean age of 44.4 years (SD = 16.7 years). For further analysis, the patients were stratified into four age groups: 18–34 years, 35–49 years, 50–64 years, and ≥65 years. Among them, 43.62% (41/94) had previously used telemedicine services, with 34.1% specifically using it for allergic diseases. When asked about consultation formats, 49% of patients preferred in-person visits, while 41% favored a hybrid model combining telemedicine and in-person care. Regarding telemedicine tools, 50% preferred telephone consultations with a doctor, and 46.1% preferred video consultations. Patients would use telemedicine preferentially for mild compared to severe allergic diseases as well as for chronic compared to acute conditions. The spectrum of diseases for which patients would use telemedicine comprised a wide range of allergic conditions, with allergic rhinoconjunctivitis (16.47%), Hymenoptera venom allergy (12.94%), and food allergy/intolerance (12.94%) cited most frequently. Only 7.06% patients indicated they would not use telemedicine for any allergic disease.

Conclusions: This study emphasizes the growing adoption and importance of telemedicine in allergy care, with a significant proportion of patients already having experience using it for managing allergic diseases. Patients' inclination toward multiple communication formats underscores the growing need for individualized management of allergic diseases.

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Original Manuscript

TeleAllergy: Potential of telemedicine in management of patients with allergies

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Abstract

Introduction: The growing prevalence of allergic diseases, alongside a shortage of trained allergists, creates significant challenges in delivering timely care, especially for underserved populations. Telemedicine presents a promising solution, offering remote care through digital tools. While telemedicine has been widely adopted in other fields, its use in allergy care remains underexplored.

Objective: This study aims to assess the potential of telemedicine in managing allergic diseases by examining patient preferences and experiences.

Methods: A survey of 27 questions was distributed to adult patients (over 18 years) with allergic diseases attending the outpatient allergy clinic at the Division of Allergy, University Hospital Basel, Basel, Switzerland, between May and August 2024. The survey covered demographic information, prior use of telemedicine, and preferences for teleconsultation modalities. It also assessed patients' willingness to share various types of clinical data, including images and written reports, and explored which allergic diseases were considered appropriate for telemedicine.

Results: A total of 102 patients participated in the survey, with a mean age of 44.4 years (SD = 16.7 years). For further analysis, the patients were stratified into four age groups: 18–34 years, 35–49 years, 50–64 years, and ≥65 years. Among them, 43.62% (41/94) had previously used telemedicine services, with 34.1% specifically using it for allergic diseases. When asked about consultation formats, 49% of patients preferred in-person visits, while 41% favored a hybrid model combining telemedicine and in-person care. Regarding telemedicine tools, 50% preferred telephone consultations with a doctor, and 46.1% preferred video consultations. Patients would use telemedicine preferentially for mild compared to severe allergic diseases as well as for chronic compared to acute conditions. The spectrum of diseases for which patients would use telemedicine comprised a wide

range of allergic conditions, with allergic rhinoconjunctivitis (16.47%), Hymenoptera venom allergy (12.94%), and food allergy/intolerance (12.94%) cited most frequently. Only 7.06% patients indicated they would not use telemedicine for any allergic disease.

Conclusion: This study emphasizes the growing adoption and importance of telemedicine in allergy care, with a significant proportion of patients already having experience using it for managing allergic diseases. Patients' inclination toward multiple communication formats underscores the growing need for individualized management of allergic diseases.

Keywords:

Teleallergy, telemedicine, allergic diseases, healthcare access, allergy management, teledermatology, synchronous communication, asynchronous communication, digital health, patient preferences, allergy diagnosis, teleconsultation, healthcare technology, patient-centered care



Introduction

The increasing prevalence of allergic diseases, combined with a persistent shortage of trained allergists, presents significant challenges in delivering timely and accessible allergy care. This issue is especially pronounced in underserved rural areas and among vulnerable populations, such as the elderly and those with mobility impairments [1, 2].

Allergic diseases encompass a wide spectrum of conditions, from common diseases like allergic rhinitis, eczema and food allergy, to rare and frequently severe disorders such as mastocytosis and hereditary angioedema. Despite their varying severity, these diseases share the need for specialized expertise and ongoing, long-term management [1, 2].

Telemedicine, particularly during the COVID-19 pandemic, has emerged as a promising and cost-effective solution to address these challenges, utilizing digital technologies to connect patients with healthcare providers. It offers two primary modes of communication: synchronous, where patients and providers interact in real-time (such as video consultations), and asynchronous, which allows communication at different times. A widely used asynchronous method is store-and-forward (SAF) technology, where clinical data, such as images or medical records, are uploaded in a digital patient folder for later review. This approach has been particularly effective in teledermatology, where visual assessments are crucial [3,4,5].

In addition to communication tools, various digital applications and technologies are available to support healthcare management, such as e-diaries ("digital companion") that track symptoms and therapy adherence, as well as electronic prescriptions and appointment scheduling systems that streamline healthcare processes [6].

While telemedicine is well-established in many medical specialties, there is limited data on its application for patients with allergies. In this study, we employed a patient-centered questionnaire to evaluate the current use of telemedicine in allergy care, to identify patients'

preferred communication tools and the specific allergic conditions for which they would be open to using telemedicine.



Methods

To evaluate patient experiences and preferences with telemedicine, we conducted a survey of 27 questions targeting adult patients (over 18 years) with various allergic diseases prior to their consultations at our outpatient allergy clinic. The questionnaire was provided to patients at check-in and completed anonymously in the waiting area before their consultation. Exclusion criteria included language barriers, cognitive impairment, and lack of informed consent.

The questionnaire, developed in German, French, Italian and English, collected demographic data, educational background, travel time to the nearest allergist, prior use of telemedicine services, the extent of health insurance coverage for telemedicine, and patients' preferences regarding teleconsultation modalities. It also explored which digital communication tools and clinical data types (e.g., images or medical reports) patients were open to sharing. Furthermore, the survey assessed which allergic diseases (categorized as mild or severe and acute or chronic based on patients' subjective evaluation of their symptoms) patients considered appropriate for telemedicine. Questions were formatted as binary responses, multiple-choice items, visual analog scales (VAS, 0–10), and open-ended text fields to capture comprehensive insights.

To analyze the data collected through the questionnaire across different demographic categories, the 102 patients were categorized into four age groups: 18-34 years, 35-49 years, 50-64 years, and over 65 years.

The study was approved by the Ethics Committee of Northwestern Switzerland. It was conducted in full compliance with the Declaration of Helsinki (1964), and Good Clinical Practice guidelines were upheld throughout.

Results

Between May 29, 2024, and August 8, 2024, a total of 102 patients completed the questionnaire, with an average age of 44.4 years (SD = 16.7 years) (Table 1). In the age group of 18-34 years, there were 35.29% patients (36/102), while 25.49% patients (26/102) were between 35-49 years, 30.39% patients (31/102) were between 50-64 years, and 8.82% patients (9/102) were 65 years or older. Among the participants, 60.78% (62/102) were women, and 39.22% (40/102) were men.

The majority of respondents resided in suburban areas with populations of 10,000 to 100,000 (36.27%, 37/102) or in rural areas with fewer than 10,000 inhabitants (35.29%, 36/102). Most patients (56.86%, 58/102) reported a travel time of 10 to 29 minutes to reach an allergist. Regarding education, 49.02% (50/102) of the patients held a university or college degree.

In terms of telemedicine usage, 43.62% (41/94) had previously used telemedicine services, with 34.15% (14/41) specifically utilizing telemedicine for allergic diseases (Figure 1). 70.59% (72/102) of patients were unaware of whether their health insurance covered telemedicine services. Regarding preferred consultation formats, 49.00% (49/100) of patients preferred in-person consultations, while 41.00% (41/100) favored a combination of telemedicine and in-person visits.

The preferred telemedicine communication tools included telephone consultations with a doctor (50.00%, 51/102), telephone consultations with trained medical staff (47.06%, 48/102), and online video consultations with a doctor (46.08%, 47/102) (Table 2). 68.63% (70/102) of patients expressed interest in sharing photos and images with healthcare providers, and 54.90% (56/102) wanted to transmit written reports of under five pages for detailed information.

Telemedicine was particularly viewed as beneficial for managing mild compared to severe

allergic diseases as well as for chronic compared to acute conditions (Figure 2). The spectrum of allergic diseases for which patients would use telemedicine encompassed allergic rhinoconjunctivitis (16.47%, 14/85), Hymenoptera venom allergy (12.94%, 11/85), and food allergy/intolerances (12.94%, 11/85) as most frequent diseases, followed by various less frequent allergic conditions (Figure 3). Only a minority of patients (7.06%, 6/85) indicated they would not use telemedicine for any allergic disease (data not shown).

Discussion

Our study demonstrates the increasing role of telemedicine in allergy care. We found high adoption rates of telemedicine, especially among younger patients, and a preference for hybrid models that combine telemedicine with in-person consultations.

Demographic data on age and gender in allergy patient surveys are limited, but our findings align with previous telemedicine studies, showing a mean age of 44.4 years and a higher participation rate among women [3]. The proportion of urban residents in our cohort was slightly lower compared to data from the Swiss Federal Statistical Office [7], likely due to the lower density of allergists in rural areas, requiring travel to urban centers for consultations [8].

A high percentage of respondents reported using telemedicine services (Figure 1), consistent with findings from other medical fields [3,9]. This increased adoption of telemedicine in our cohort may partly be explained by the higher educational attainment often associated with higher usage rates [9]. Patients aged 35-49 years were the most frequent users of telemedicine (Figure 1), aligning with previous research. Interestingly, those aged 65 and older used telemedicine services more than those aged 50-65 years, suggesting an unmet need for digital health services among older, potentially less mobile patients—a trend also observed in other studies [10]. However, given the small sample of patients aged 65 and older (9 patients), this finding should be interpreted cautiously.

Although we couldn't determine the specific share of allergy services within telemedicine offerings, allergy services were not typically emphasized in studies assessing usage rates across specialties [11]. The high utilization rates in our study may also be influenced by selection bias, as participants were surveyed in the waiting area of the outpatient allergy clinic.

Despite 29 of the 37 Swiss health insurance providers offering telemedicine policies and basic insurance (OKP) covering telemedicine services when proven effective, 70.63% of patients in our cohort were unaware of their coverage [12]. This suggests an unmet need

for allergy services, as many patients may be paying out-of-pocket for telemedicine. On the other hand, younger patients, who often opt for insurance plans with higher deductibles, may find telemedicine more cost-effective than in-person visits. This trend is likely influenced by the Swiss healthcare system, which allows for flexible deductible options.

Older patients tend to prefer in-person consultations, likely due to concerns about remote care quality, limited familiarity with technology, and reliance on face-to-face (FTF) interactions for building trust [13,14]. In contrast, 41.18% of all patients preferred a hybrid model that combines telemedicine with in-person visits, while only 14.71% favored telemedicine exclusively. This suggests that digital services are seen as complementary to, rather than a replacement for, traditional in-person care, enhancing access and alleviating pressure on healthcare systems [4,9]. Younger patients (18-34 years) preferred telephone consultations, particularly when integrated with video or in-person visits for comprehensive assessment. In contrast, patients over 50 years favored video consultations by a doctor (44.68%), likely due to their preference for FTF interactions [5,15].

Digital health tools, including online appointment scheduling and e-prescriptions, were widely embraced by patients aged 18-49, indicating higher comfort with technology in these age groups. However, adoption was lower among patients over 65, likely due to barriers such as unfamiliarity with digital platforms and concerns about data security [15,16,17].

The field of allergy care lacks substantial evidence on the most useful communication types for telemedicine consultations [5]. In our study, most patients expressed interest in uploading photos, a preference similar to findings from dermatology, where visual information is crucial for remote consultations [4]. Over half of the patients in our study preferred sharing detailed written reports, reflecting the complex and heterogeneous nature of allergic diseases, which may require more individualized data exchanges.

Patients in our survey expressed a preference for telemedicine in managing mild and chronic allergic diseases (Figure 2), aligning with broader trends in telemedicine across specialties [18]. While a small proportion of patients expressed concerns about using telemedicine for severe allergic diseases, some studies suggest that telemedicine can positively impact outcomes for diseases like anaphylaxis by providing specific management instructions [19]. However, telemedicine should not be considered a substitute for emergency care. It can play an important role in managing allergies, but cannot replace

emergency responses or in-person care. Given that many allergic diseases are chronic and benefit from ongoing monitoring, telemedicine represents an effective approach for long-term management, a view that was supported by most participants in our study.

In conclusion, our study highlights the growing role of telemedicine in allergy care. High adoption rates, especially among younger patients, suggest that telemedicine can complement in-person care. Future retrospective research is needed to refine teleconsultation strategies, enhancing diagnostic accuracy, therapeutic effectiveness, and patient satisfaction, thereby maximizing patients' benefits from telemedicine in allergy care.

Acknowledgements

We sincerely thank all patients in this study for their time and effort in completing the questionnaires, which provided invaluable insights.

Conflict of Interest

All authors declare that economic interests had no influence on the preparation of this manuscript. H.L. has provided a lecture and received honoraria sponsored by Allergopharma, Almirall, BioCryst, Blueprint, and Cogent, participated in a congress in collaboration with Almirall and serves as a member of the medical team at derma2go. E.H. and L.B. declare no conflict of interest. C.G. has consulted for and received honoraria from Almirall AG, Eli Lilly (Suisse) SA, Janssen-Cilag AG, L'Oréal S.A, L'Oréal Deutschland GmbH, LEO Pharma GmbH, Leo Pharmaceutical Products Sarath Ltd, MSD Merck Sharp & Dohme AG, Merz Pharma Schweiz, Novartis Pharma Schweiz AG, Viatrix Pharma GmbH, Dr. August Wolff GmbH & Co. KG Arzneimittel and is the Medical Director at/ owns shares in derma2go. K.H. has consulted for and received honoraria from ALK-Abello, Allergopharma, Almirall, BioCryst, Blueprint, Cogent, Galderma, KalVista, Leo, Menarini, Novartis, Pfizer, Sanofi, Takeda, and Thermo Fisher, and own shares in derma2go.

Abbreviations

FTF	Face-to-face
SAF	Store-and-forward
VSA	Visual analog scales

Figures and Tables

Table 1: Patients (n=102) by age group, gender, residence, distance to allergologist, and education level.

Table 2: Patients' (n=102) preferences for digital communication and telemedicine consultations for allergic diseases.

Figure 1: Patients' experience and preferences in telemedicine.

- a) Patients (%) with previous experience in telemedicine.
- b) Patients (%) with previous experience in telemedicine consultations for allergic conditions.
- c) Patients (%) aware of their insurance coverage for telemedicine.
- d) Patients (%) by preferred consultation method.

Figure 2: Patients' willingness to use telemedicine based on the type of allergic disease.

- a) Patients (%) willing to use telemedicine for mild allergic diseases.
- b) Patients (%) willing to use telemedicine for severe allergic diseases.
- c) Patients (%) willing to use telemedicine for acute allergic diseases.
- d) Patients (%) willing to use telemedicine for chronic allergic diseases.

Figure 3: Allergic diseases for which patients would use telemedicine.

Characteristics	Patients (n=102), (%)	Age			
		18-34 years	35-49 years	50-64 years	>65 years
Gender					
All	102 (100%)	36 (35.29%)	26 (25.49%)	31 (30.39%)	9 (8.82%)
Female	62 (60.78%)	22 (35.48%)	15 (24.19%)	19 (30.65%)	6 (9.68%)
Male	40 (39.22%)	14 (35%)	11 (27.5%)	12 (30%)	3 (7.5%)
Diverse	0	0	0	0	0
N/A	0	0	0	0	0
Place of residence					
Urban (>100,000 inhabitants)	28 (27.45%)	10 (35.71%)	8 (28.57%)	8 (28.57%)	2 (7.41%)
Urban (10,000-100,000 inhabitants)	37 (36.27%)	16 (43.24%)	7 (18.92%)	10 (27.03%)	4 (10.81%)
Rural (<10,000 inhabitants)	36 (35.29%)	9 (25%)	11 (30.56%)	13 (36.11%)	3 (8.33%)
N/A	1 (0.98%)	1 (100%)	0	0	0
How far is your nearest allergologist's office?					
< 10 min	14 (13.73%)	5 (35.71%)	3 (21.43%)	5 (35.71%)	1 (7.14%)
10 – 29 min	58 (56.86%)	22 (37.93%)	14 (24.14%)	15 (25.86%)	7 (12.07%)
30 – 59 min	21 (20.59%)	6 (28.57%)	7 (33.33%)	7 (33.33%)	1 (4.76%)
60 – 90 min	6 (5.88%)	2 (33.33%)	1 (16.67%)	3 (50%)	0
> 90 min	2 (1.96%)	0	1 (50%)	1 (50%)	0
N/A	1 (0.98%)	1 (100%)	0	0	0
Highest level of education					
Primary and secondary school	6 (5.88%)	2 (33.33%)	2 (33.33%)	1 (16.67%)	1 (16.67%)
High School Diploma	14 (13.73%)	9 (64.29%)	4 (28.57%)	0	1 (7.14%)
Vocational Training	32 (31.37%)	8 (25%)	9 (28.13%)	12 (37.5%)	3 (9.38%)
University or college degree	50	17	11	18	4

	(49.02%)	(34%)	(22%)	(36%)	(8%)
N/A	0	0	0	0	0

Table 1: Patients (n=102) by age group, gender, residence, distance to allergologist, and education level.

Characteristics	Patients n=102, (%)	Age			
		18-34 years	35-49 years	50-64 years	>65 years
What findings would you want to transmit digitally (via telemedicine) to a doctor?					
Written reports of <5 pages	56 (54.90%)	23 (41.07%)	16 (28.57%)	13 (23.21%)	4 (7.41%)
Written reports of 5-10 pages	26 (25.49%)	10 (38.46%)	8 (30.77%)	6 (23.08%)	2 (7.69%)
Written reports of >10 pages	26 (25.49%)	10 (38.46%)	5 (19.23%)	9 (34.62%)	2 (7.69%)
Photos and images	70 (68.63%)	27 (38.57%)	15 (21.43%)	23 (32.86%)	5 (7.14%)
Short video recordings (approximately 15 seconds)	28 (27.45%)	12 (42.86%)	8 (28.57%)	7 (25%)	1 (3.57%)
Voice messages	28 (27.45%)	8 (28.57%)	6 (21.43%)	13 (46.43%)	1 (3.57%)
Digital patient diaries for therapy and symptom assessment	23 (22.55%)	7 (30.43%)	2 (8.70%)	13 (56.52%)	1 (4.35%)
N/A	10 (9.80%)	1 (10%)	5 (50%)	1 (10%)	3 (30%)
For which allergological conditions could you imagine contacting a doctor via telemedicine?					
Telephone consultation by trained medical staff	48 (47.06%)	21 (43.75%)	10 (20.83%)	16 (33.33%)	1 (2.08%)
Online video consultation by trained medical staff	33 (32.35%)	13 (39.39%)	7 (21.21%)	11 (33.33%)	2 (6.06%)
Consultation via email or chat by trained medical staff	27 (26.47%)	9 (33.33%)	5 (18.52%)	10 (37.04%)	3 (11.11%)
Telephone consultation by a doctor	51 (50%)	23 (45.10%)	14 (27.45%)	12 (23.53%)	2 (3.92%)
Online video consultation by a doctor	47 (46.08%)	15 (31.91%)	11 (23.40%)	16 (34.04%)	5 (10.64%)
Consultation via email or chat by a doctor	24 (23.53%)	10 (41.67%)	6 (25%)	6 (25%)	2 (8.33%)

Digital appointment booking for an in-person consultation	43 (42.16%)	21 (48.84%)	13 (30.23%)	9 (20.93%)	0
E-prescription (digital medication prescription)	42 (41.18%)	24 (57.14%)	12 (28.57%)	6 (14.29%)	0
Digital patient information (e.g., instructional videos)	27 (26.47%)	14 (51.85%)	5 (18.52%)	8 (29.63%)	0
Digital patient diaries for therapy and symptom assessment	24 (23.53%)	12 (50%)	8 (33.33%)	4 (16.67%)	0
N/A	13 (12.75%)	2 (15.38%)	5 (38.46%)	5 (38.46%)	1 (7.69%)

Table 2: Patients' (n=102) preferences for digital communication and telemedicine consultations for allergic diseases.

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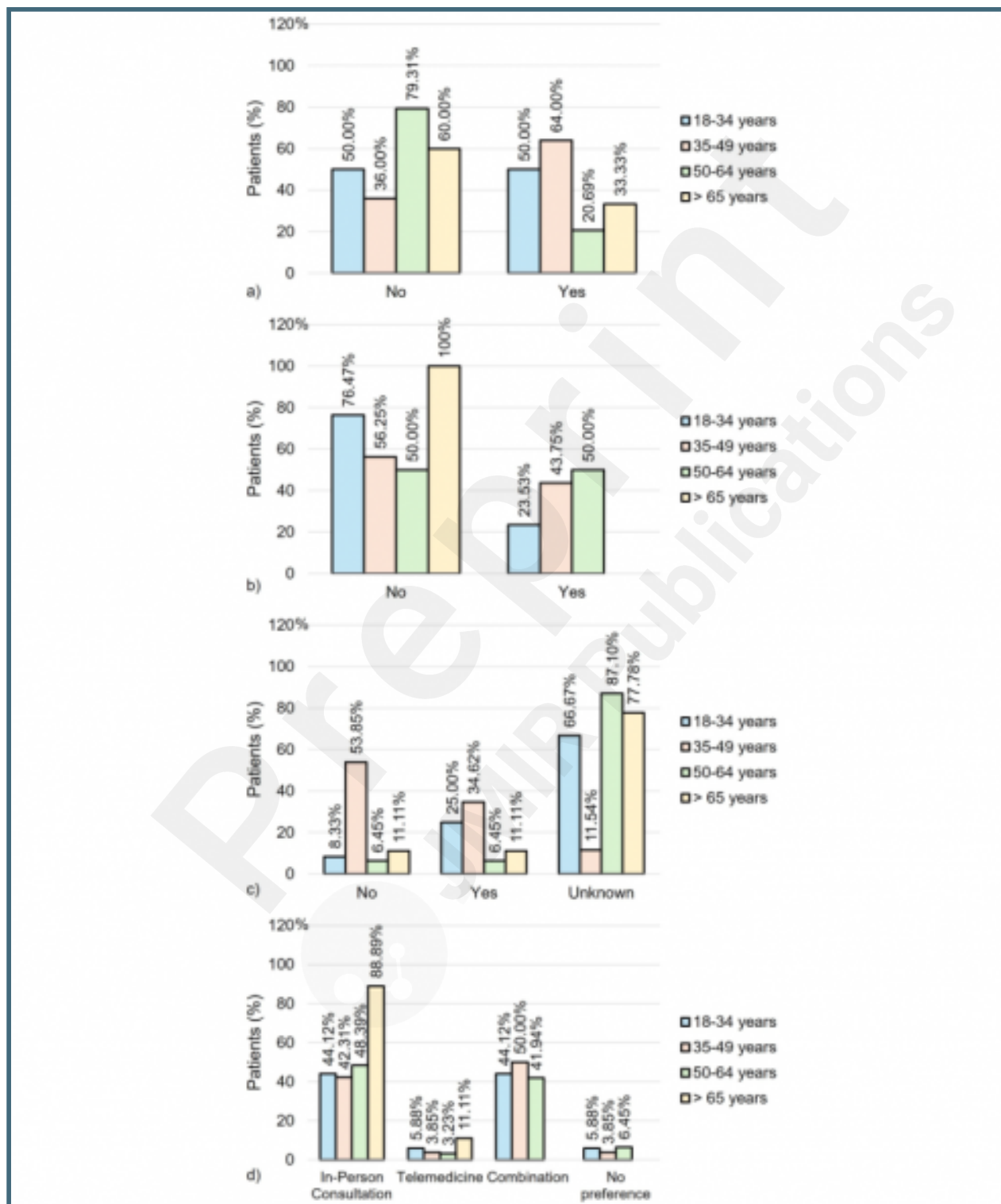
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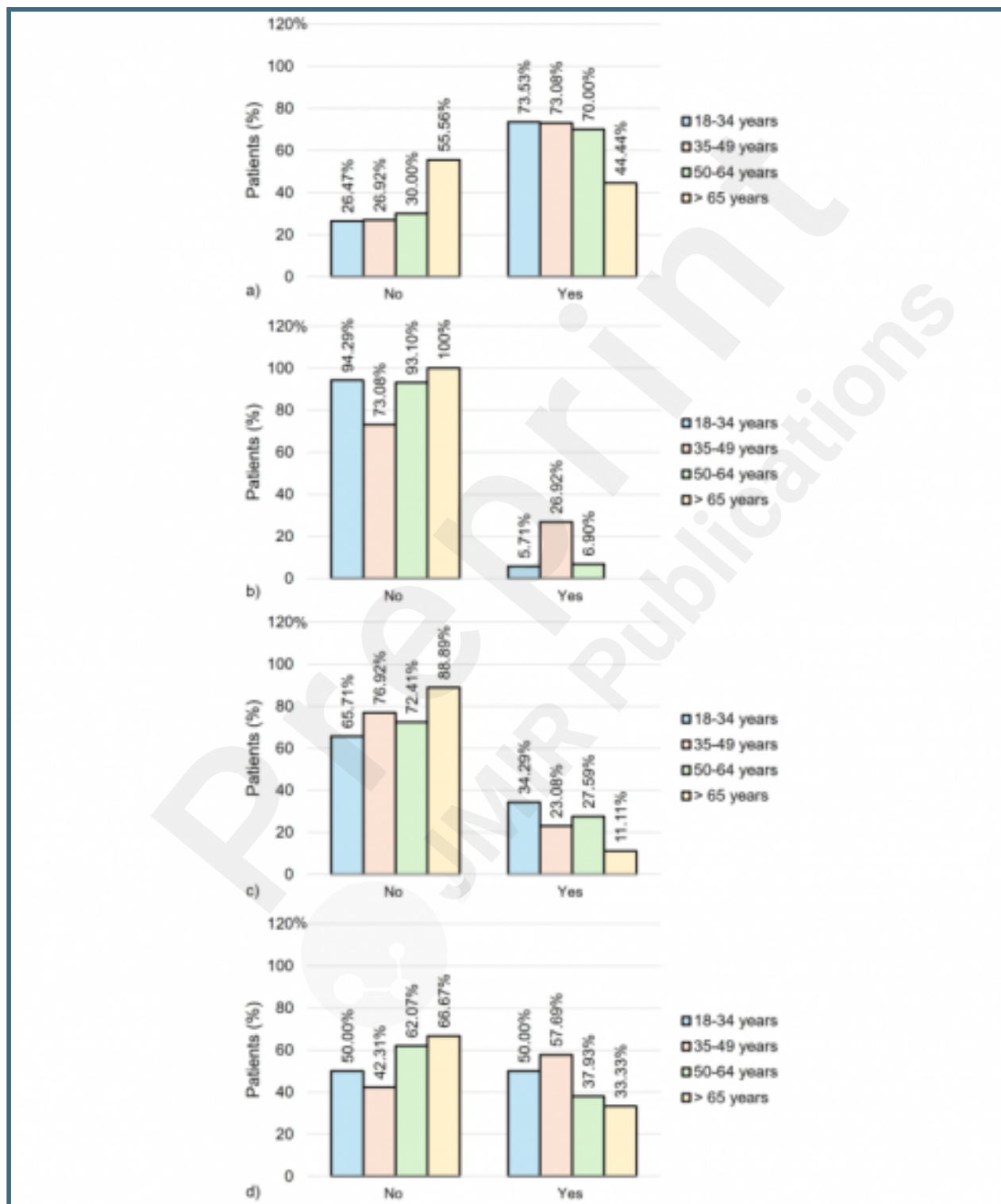
Supplementary Files

Figures

Patients`experience and preferences in telemedicine. a) Patients (%) with previous experience in telemedicine. b) Patients (%) with previous experience in telemedicine consultations for allergic conditions. c) Patients (%) aware of their insurance coverage for telemedicine. d) Patients (%) by preferred consultation method.



Patients' willingness to use telemedicine based on the type of allergic disease. a) Patients (%) willing to use telemedicine for mild allergic diseases. b) Patients (%) willing to use telemedicine for severe allergic diseases. c) Patients (%) willing to use telemedicine for acute allergic diseases. d) Patients (%) willing to use telemedicine for chronic allergic diseases.



Allergic diseases for which patients would use telemedicine.

