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Care for children with atopic dermatitis in the Netherlands during the COVID-19 pandemic: Lessons from the first wave and implications for the future

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Abstract

The first wave of the coronavirus disease 2019 (COVID-19) pandemic had an enormous impact on health-care services, including on care provision for children with atopic dermatitis (AD). We investigated the impact of COVID-19 on the care for children with moderate to severe AD at our tertiary outpatient clinic and examined satisfaction with care. We reviewed outpatient records, comparing total number and types of consultations during the first COVID-19 wave (March until July 2020) with the corresponding months of 2019 and 2018. In addition, we conducted a questionnaire-based study investigating the impact of COVID-19 on clinical and psychological symptoms, and satisfaction with care. A total number of 913 consultations (466 individual children) were conducted during the first COVID-19 wave in 2020, while 698 (391 individual children) and 591 consultations (356 individual children) were conducted in 2019 and 2018. The proportion of remote consultations was higher (56.2%) compared to 14.0% in 2019 and 12.7% in 2018. Worsening of AD was reported by 9.7% of caretakers. Overall satisfaction with provided care was high (8.6; interquartile range [IQR] = 7.3–10.0). Caretakers receiving face-to-face consultation were significantly ($p = 0.026$) more satisfied (9.0; IQR = 8.0–10.0) than caretakers receiving remote consultation (7.9; IQR = 7.0–9.5). The COVID-19 pandemic had an unprecedented impact on care provision for children with AD, particularly on the number of remote consultations. Overall satisfaction with care was high. The impact of COVID-19 on disease severity remained limited. Remote consultations seem to be a useful tool that can be put into practice during the COVID-19 pandemic.

KEYWORDS

atopic dermatitis, coronavirus disease 2019, pediatric dermatology, remote care

1 | INTRODUCTION

Atopic dermatitis (AD) is the most common chronic relapsing skin disease, which is characterized as a pruritic dermatitis that typically

develops during infancy.¹ Management of AD can be complex,^{2,3} time-consuming,⁴ and can have a significant impact on children with AD and their families.^{5,6} Children with moderate to severe AD frequently visit outpatient clinics. During these consultations,

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informing and training children and caretakers in AD treatment is essential, since adequate treatment management skills are necessary for a successful treatment.⁷ Continuity of care for these children is therefore important.

Since the first case of COVID-19 in the Netherlands,⁸ the coronavirus has affected many people and challenged the Dutch health-care system. Although COVID-19 itself may cause fewer symptoms and has a better prognosis in children compared to adults,⁹ the care for children with AD was affected by the restrictions to prevent spread of the novel coronavirus.¹⁰ From March to July 2020, hospitals were forced to downscale non-COVID care.¹¹ A survey among dermatologists showed rapid adaptation of remote care during the COVID-19 pandemic.¹²⁻¹⁴ At our outpatient clinic KinderHaven, a specialized, academic outpatient clinic for children with difficult to treat and moderate to severe atopic diseases, we expanded remote care and reduced the number of face-to-face consultations, while aiming to continue providing care.

In the current second wave of the COVID-19 pandemic,¹⁵ evaluation of care and sharing experiences is important to optimize care provision during this second wave or a pandemic in general. Therefore, the aim of our study was to evaluate the effect of the first COVID-19 wave on the care for children with moderate to severe AD and their caretakers at our AD expert center and to investigate the use and satisfaction with remote care. In addition, the effect of COVID-19 on clinical and psychological symptoms was investigated.

2 | METHODS

2.1 | Setting

This study was conducted at KinderHaven, an outpatient expert clinic for children with atopic diseases of Erasmus MC University Medical Centre-Sophia Children's Hospital-Kinderhaven, Rotterdam, the Netherlands. In Kinderhaven, children with AD and other atopic diseases (food allergy, asthma and allergic rhinitis) are diagnosed and treated (multidisciplinary). This specialized, academic outpatient clinic focuses primarily on treating children with difficult to treat (caused by comorbidities or social factors) and moderate to severe atopic diseases.

2.2 | Care provision during the first COVID-19 wave

During the COVID-19 pandemic, patients were screened approximately 2 weeks before planned consultations in order to determine which consultation would be suitable to change from face-to-face consultation into a remote consultation (telephone consultation with or without patient captured clinical images with emails) and which could be postponed. In most cases, screening was conducted by the treating physician. During this process, disease severity, patient needs and preferences influenced the type of care provided. In the

first 3 weeks of the pandemic, remote consultations were used for newly referred patients. Face-to-face consultations were conducted at a later stage for these patients.

In addition to planned consultations, caretakers of children receiving care at our outpatient clinic could request consultations by telephone or email. All caretakers were then informed on the COVID-19 regulations at our clinic by telephone, mail or email. Caretakers of children with systemic immunomodulatory drugs received a letter with information on the use of systemic treatment (e.g., dupilumab, cyclosporin) during the COVID-19 pandemic.

2.3 | Evaluation of care for children with AD

First, a retrospective study was performed to evaluate the type (newly referred face-to-face consultation, follow-up face-to-face consultation, follow-up remote consultation, telephone consultation with or without patient captured clinical images) and number of consultations conducted during the first COVID-19 wave (1 March until 1 July 2020). Thereafter, we compared consultations during this period with consultations in the corresponding period of 2018 and 2019. Data were retrieved by searching our electronic patient records for consultations at our specialized AD clinic.

2.4 | Impact of COVID-19 and satisfaction with care

Second, an online questionnaire was sent to all caretakers of children with AD with an available email address and who consulted our outpatient clinic during the first COVID-19 wave (1 March to 1 July 2020). The questionnaire was sent by email to caretakers in July 2020 and a reminder was sent after 4 weeks. The questionnaire included questions on several topics, including sociodemographic and medical characteristics, as well as the impact of COVID-19 on clinical and psychological symptoms. Clinical symptoms comprised COVID-19 suspicion, presence of COVID-19-related symptoms and COVID-19 test. Psychological symptoms comprised presence of COVID-19 stress-related symptoms in the child and the caregiver ("Did your child experience stress due to COVID-19?"), and the child's perceived vulnerability to COVID-19 ("Do you perceive your child as more vulnerable to COVID-19 in comparison with other children?"). For a comprehensive overview of the questionnaire, see Appendix S1. Furthermore, caretakers indicated which form of care they received during the first COVID-19 wave, namely face-to-face consultation or remote consultation (telephone consultation with or without patient-captured clinical images). Additionally, three statements on the usability of remote consultations and clinical images were included (i.e., future use, representation of disease severity, and possible privacy concerns). Satisfaction with care was measured with a general question on satisfaction on a 5-point scale and with the Patient

Satisfaction Questionnaire (PSQ).¹⁶⁻¹⁸ The PSQ measures caretakers' satisfaction based on five items: (i) addressing needs; (ii) active involvement in interaction; (iii) information received; (iv) emotional support received; and (v) interaction in general. Answers were given on Visual Analog Scales (VAS) ranging 0-100 with higher scores indicating higher satisfaction.

2.5 | Statistical analyses

Descriptive statistics were used to describe differences in consultations between 2018, 2019, and 2020. Mann-Whitney *U*-tests were used to test for differences in number of consultations per patient and consultation type (remote and face-to-face) before and during the COVID-19 pandemic. Furthermore, descriptive statistics were performed to describe the sociodemographic and medical characteristics of the study sample. The response rate was calculated by dividing the number of responders by the total number of patients who received care during the previous mentioned period. A non-responders analysis was conducted by comparing age, sex, and consultation type between responders and all children who consulted our outpatient clinic within this period. Outcomes of patients who only received face-to-face consultation were compared with patients who only received remote consultation. Mann-Whitney *U*-tests were used for continuous variables and χ^2 -tests for ordinal and nominal variables. Fisher's exact tests were used for ordinal and nominal variables with a small sample size. For all analysis, SPSS version 25 software was used, and $p < 0.05$ was considered statistically significant.

2.6 | Ethical approval

This study, as well as our study investigating COVID-19 in our adult outpatient clinic,¹⁹ was approved by the local Medical Research

Ethics (MEC-2020-0413). All participants gave consent to use the collected data for scientific research.

3 | RESULTS

3.1 | Evaluation of care at our outpatient clinic during the first COVID-19 wave

A total of 466 children (including 111 newly referred children) with AD received care at Kinderhaven during the first COVID-19 wave (1 March until 1 July 2020). In 2019 and 2018, respectively, 391 (100 newly referred children) and 356 (129 newly referred children) individual children received care in this corresponding period. Furthermore, a total of 913 consultations were conducted during the first wave, while 698 and 591 consultations were conducted in 2019 and 2018 (Figure 1, Table 1). These data show an increase in the number of total consultations of 30.8% compared to 2019 and of 54.5% compared to 2018, with more consultations per child compared to previous years ($p = 0.001$). The proportion of remote consultations was much higher (56.2%, $n = 513$ in 2020, $p < 0.000$), compared to 2019 (14.0%, $n = 98$) and 2018 (12.7%, $n = 75$). The absolute number of remote consultations increased by roughly 500% compared to 2019. In addition, the absolute number of face-to-face consultations during the first COVID-19 wave was 400 compared to 600 in 2019, and 516 in 2018 (Figure 1). Details of all consultations from January to August 2020 are shown in Figure 2. In week 11, the government of the Netherlands imposed COVID-19-related restrictions. Following these restrictions, the number of face-to-face consultations immediately dropped. After a month, the number of face-to-face consultations started to increase, and after approximately 4 months, the ratio between face-to-face consultations and remote consultations normalized. In short,

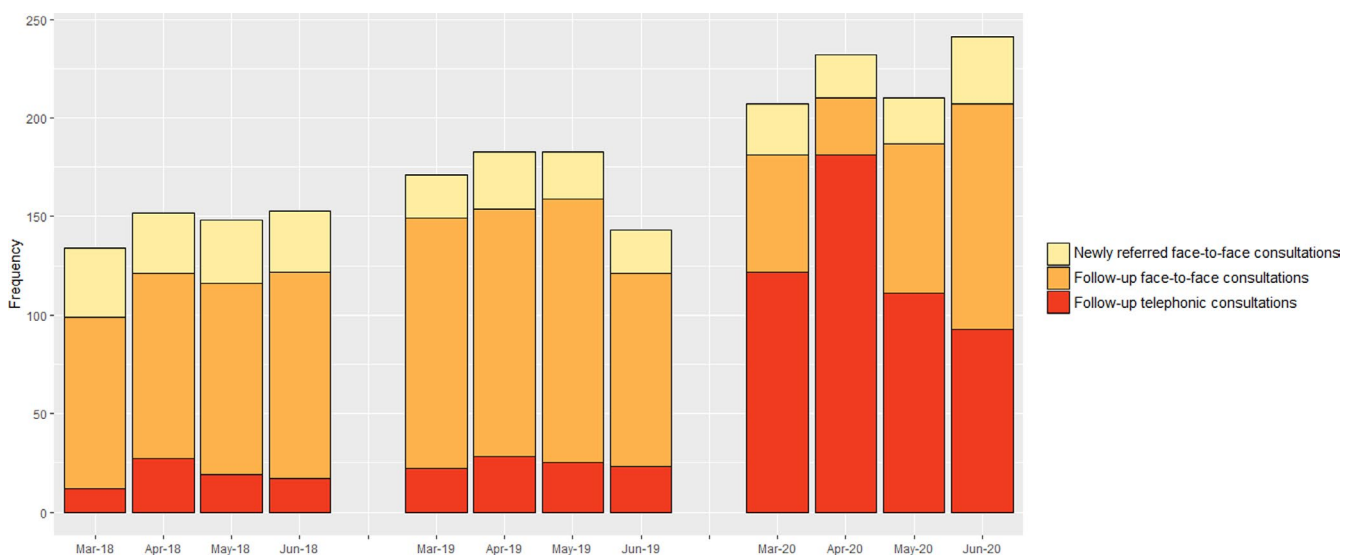


FIGURE 1 Overview of consultations per month during the first COVID-19 wave and corresponding period in 2019 and 2018

	2018	2019	2020	<i>p</i> -value difference ^a
Individual patients (n)	356	391	466	–
Total number of consultations (n)	591	698	913	–
Consultation type				0.000
Face-to-face consultations (total), % (n)	87.3% (516)	86.0% (600)	43.9% (400)	
Newly referred face-to-face consultations, % (n)	21.8% (129)	14.3% (100)	12.2% (111)	
Follow-up face-to-face consultations, % (n)	65.5% (387)	71.6% (500)	31.7% (289)	
Follow-up remote consultations, % (n)	12.7% (75)	14.0% (98)	56.2% (513)	
Consultations per individual patient				0.001
1 consultation, % (n)	55.3% (197)	48.6% (190)	44.4% (207)	
2 consultations, % (n)	31.5% (112)	34.0% (133)	33.3% (155)	
3 consultations, % (n)	7.6% (27)	12.0% (47)	12.4% (58)	
≥4 consultations, % (n)	5.6% (20)	5.4% (21)	9.9% (46)	

^aDifference before (2018 and 2019) and during the coronavirus disease 2019 pandemic (2020).

TABLE 1 Overview of consultations per year between the 1 March until 1 July

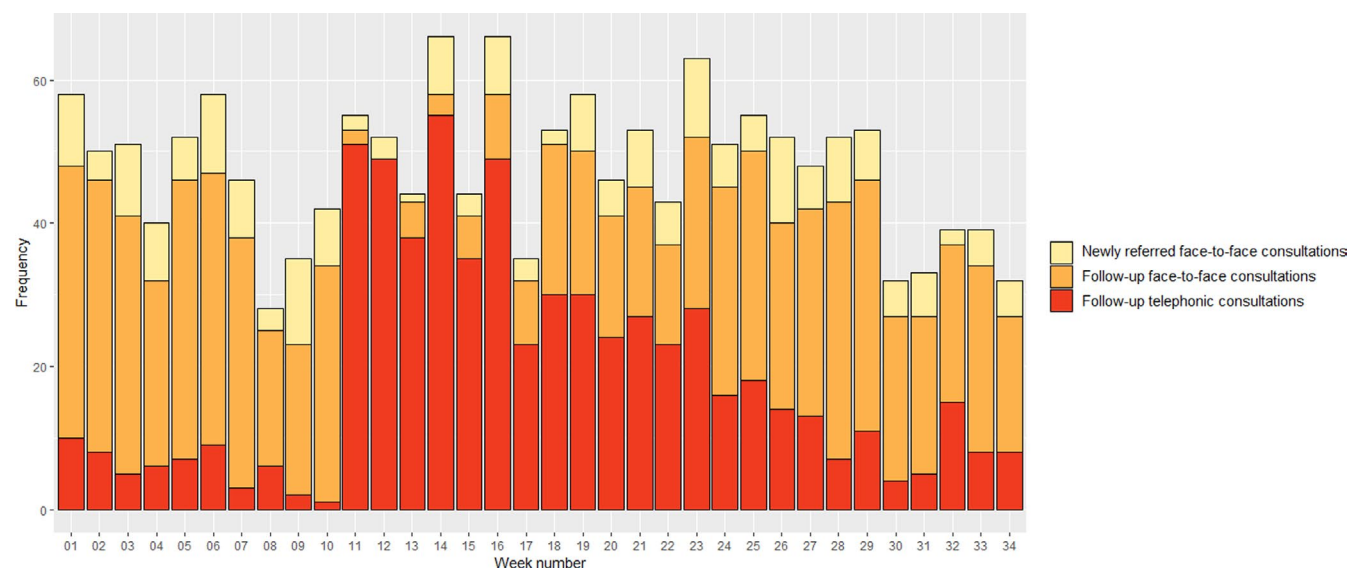


FIGURE 2 Overview of consultations per week in 2020

following the COVID-19 restrictions more consultations in total were conducted and more remote consultations were performed immediately.

3.2 | Evaluation of patient-reported care

A questionnaire was sent to all available email addresses (368/466) of caretakers who received care for their child during the first COVID-19 wave. The questionnaire was completed by 144 caretakers (response rate = 39.1%). An overview of patient characteristics is presented in

Table 1. The majority of children were male (62.5%) with a median age of 6.0 years (interquartile range [IQR] = 2.0–11.0), 28.5% under the age of 2 years, and 21.5% were 12 years or older. No significant differences in age ($p = 0.58$), sex ($p = 0.09$), and type of consultation ($p = 0.27$) were found between the total group of patients ($n = 466$) who received care during the first COVID-19 wave and responders. The median age of all patients who received care was 6.0 years (IQR = 1.6–10.3) and 54.6% male. Nearly all patients (97.9% of 144 children) were treated with topical corticosteroids or calcineurin inhibitors. Dupilumab was used in 2.1% and in 10.4% other systemic immunosuppressants (such as cyclosporin) were used.

Face-to-face consultations were conducted in 50.8%, while remote consultations were conducted in 58.5% of the patients. A total of 18.3% had both a face-to-face and remote consultation during this period. Of all remote consultations, 32.4% of consultations were performed with clinical images provided by caretakers.

3.3 | Prevalence and impact of COVID-19

A small proportion of children (6.3%) were suspected to have COVID-19. Coughing (88.9%) was the most frequently reported symptom followed by fever (66.7%). The children tested for COVID-19 were all negative (Table 1). Almost half of caretakers (43.7%) reported that their child experienced COVID-19-related stress and 75.7% of caretakers reported to have experienced COVID-19-related stress themselves. Besides, more than a third (38.9%) of the caretakers believed that their child was more vulnerable to COVID-19. Different reasons were given why caretakers perceived their child as more vulnerable; for example, the skin disease and its treatment (41.1% in total, 50% in children with systemic treatment), lack of information on impact of COVID-19 and skin disease (16.1% in total, 5% in children with systemic treatment), less availability of care due to COVID-19 (5.4% in total, 0% in children with systemic treatment), or another reason (18.7%; e.g., comorbidities such as asthma or other chronic diseases). Caretakers who perceived their child as more vulnerable experienced more COVID-19-related stress ($p < 0.001$). Furthermore, 9.7% of all caretakers indicated that the AD severity of their child worsened during the first COVID-19 wave, while 71.5% did not report changes in severity or AD and in 10.4% AD improved.

3.4 | Satisfaction with care during the first COVID-19 wave

General satisfaction with care was high. Only 1.9% caretakers were (very) unsatisfied with the care their child received during the first COVID-19 wave (Table 2). Caregivers were significantly more satisfied with care during face-to-face consultations than remote consultations ($p < 0.000$). Caretakers of children who received remote consultation were significantly less satisfied with the emotional support scale of the PSQ ($p = 0.039$) and on the overall satisfaction scale ($p = 0.026$). In addition, AD severity improved significantly more often according to caretakers in children who visited the outpatient clinic compared to those receiving remote consultation ($p = 0.026$). Furthermore, caretakers who believed their child was more vulnerable for COVID-19 were significantly ($p = 0.021$) less satisfied with remote consultation (77.0; 95% confidence interval [CI] = 70.2–84.8) compared to a face-to-face consultation (88.0; 95% CI = 83.2–93.4) (Table 3).

3.5 | Remote consultations

Approximately one-third of caretakers (32.4%) provided clinical images before remote consultation. A significant number of caretakers

TABLE 2 Demographics, prevalence, and impact of COVID-19 (n = 144)

Characteristics	Values
Age, median (IQR)	6.0 (2–11)
Male, (n)	62.5% (90)
Current therapy, (n)	
Topical corticosteroids/calcineurin inhibitors	97.9% (141)
Oral immunosuppressants	10.4% (15)
Dupilumab	2.1% (3)
Suspected of COVID-19 by caretakers, (n)	6.3% (9)
Symptoms suggestive of COVID-19, (n)	
Cough	88.9% (8)
Fever (>38°C)	66.7% (6)
Headache	55.6% (5)
Sore throat	33.3% (3)
Other	55.6% (5)
Tested for COVID-19, (n)	4.9% (7)
Tested negative	4.9% (7)
Stress related to COVID-19	
In child (yes)	43.7% (63)
In caretaker (yes)	75.7% (109)
Vulnerability to COVID-19	
More vulnerable (yes)	38.9% (56)

Abbreviations: COVID-19, coronavirus disease 2019; IQR, interquartile range.

believed that these images sufficiently reflected the severity of disease (39.1% agreed, 39.1% neutral, 21.7% disagreed). Most caretakers (87%) reported no concerns regarding privacy or data security when sending images. Caretakers of children who provided clinical images were less satisfied with the emotional support scale of the PSQ ($p = 0.003$) compared to caretakers who did not provide clinical images. There were no differences on other scales of the PSQ or general satisfaction (see Appendix S2).

When asked if caretakers would prefer more remote consultations in future, 31.9% agreed. Caretakers mentioned the opportunity to use remote consultations in particular for regular follow-up visits and when AD was stable. One-fifth (21.7%) of caretakers did not have a preference for the type of consultation, and 46.0% had a preference for a face-to-face consultation. Reasons mentioned by caretakers with a preference for face-to-face consultation were: “physical examination is important”, “face-to-face consultations raise treatment adherence”, and “face-to-face consultations are more efficient”.

4 | DISCUSSION

This study shows that the first wave of the COVID-19 pandemic (1 March until 1 July) led to unprecedented changes in the provision of care for children with AD. COVID-19 led to a substantial increase in consultations (in number of individual consulted

TABLE 3 Satisfaction with care and changes in AD severity of COVID-19 in the total group and differences in satisfaction between the face-to-face and remote consultation group

	Total	Face-to-face consultations only	Remote consultations only	p-value difference ^a
General satisfaction with received care for AD				
(Very) unsatisfied	1.9%	0.0%	3.4%	<0.001
Neutral	25.2%	10.2%	37.9%	
Satisfied	47.4%	55.1%	46.6%	
Very satisfied	23.7%	34.7%	12.1%	
Changes in AD severity				
Worsened	9.7%	4.1%	13.8%	0.015
Unchanged	71.5%	79.6%	81.0%	
Improved	10.4%	20.4%	5.2%	
Patient satisfaction (PSQ), median [IQR]				
Information provided	86.0 [72.0–95.0]	89.0 [74.0–89.0]	81.0 [69.5–90.5]	0.069
Active involvement	85.0 [72.0–100.0]	85.0 [75.0–100]	82.5 [70.0–93.5]	0.392
Needs addressed	84.0 [74.0–100.0]	86.0 [76.0–92.0]	80.0 [68.5–90.0]	0.059
Emotional support	82.0 [63.0–93.0]	88.0 [70.0–95.0]	74.5 [51.5–90.5]	0.039
Interaction in general	86.0 [73.0–100.0]	90.0 [80.0–100.0]	78.5 [69.5–94.5]	0.026

Abbreviations: AD, atopic dermatitis; COVID-19, coronavirus disease 2019; IQR, interquartile range; PSQ, Patient Satisfaction Questionnaire.

^aDifference between caretakers in the face-to-face consultation group and the remote consultation group.

patients and consultations per patient) and in remote consultations (increase of 500%). A large proportion of children and caretakers experienced COVID-19-related stress; besides, more than a third (38.9%) of the caretakers believed that their child was more vulnerable to COVID-19. Overall satisfaction with care during this period was high and reported worsening of AD severity remained limited. Satisfaction with remote consultation was high, although caretakers considering their children to be more vulnerable were less satisfied with remote consultation.

In the first part of this study, we showed an increase in individual patients that consulted our outpatient clinic, even when corrected for an average annual growth of 7.4% at our center.²⁰ During this pandemic, usage of remote care has increased rapidly²¹ and remote services were expanded at our outpatient clinic as well. The increase in consultations may be caused by two major factors: the need for reassurance and increased efficiency of remote consultations. Caretakers have the need for information, the need to be listened to, and the need to be reassured in face of an unknown situation.²² Moreover, care providers may have lowered the threshold for consultations in order to assure continuous access to dermatological care. This may be reflected in our results that show an increase in the number of individual patients who were consulted, as well as an increase in number of consultations per patient. Although limited literature is available, a similar increase in total (remote) consultations has been reported in (adult) patients with (chronic) inflammatory diseases as well.²³ It would be interesting to further investigate the impact of COVID-19 on health care among different diseases, as well as different age groups.

Similar to other studies investigating satisfaction with health care during the COVID-19 pandemic,^{24,25} we found high satisfaction with care. Although caretakers were significantly more satisfied with face-to-face consultations, satisfaction with remote consultations was high as expected.²⁶ The child's perceived vulnerability by caretakers to COVID-19 negatively affected satisfaction with remote consultation. These caretakers also experienced more COVID-19-related stress. Further research is needed to investigate this phenomenon and if stress and vulnerability affect preference for consultation type. Families with a lot of COVID-19-related worries should preferably be seen at the outpatient clinic to ensure greater satisfaction with care. In addition, care providers should invest in remote information provision in general.

Another lesson we learned is that a large portion of caretakers (43.7%) reported that their child suffers from COVID-19-related stress. An online survey among caretakers indicated that impact on children's behavioral and emotional problems is mediated by individual parental stress, dyadic stress, and quality of the home environment.²⁷ During consultation, dermatologists should give attention to these factors and the feasibility of the treatment they prescribe.

Although we conducted far more remote consultations, only a small percentage of caretakers (9.7%) reported worsening of AD severity. These results suggest that the impact of the COVID-19 pandemic on our patients with AD was limited. Interestingly, improvement of AD was more reported in the face-to-face consultations, suggesting a better assessment of the skin compared with remote care. Further improvements using remote care might be achieved when photographs of the skin or video consultation are

used. Overall, these results suggest that the impact of COVID-19 on children with AD remains limited when care provision is continued using remote care. This is supported by another study which found no differences in outcome between patients with AD treated remotely and face to face.²⁸ Therefore, dermatologists should consider to continue care by remote consultations during this COVID-19 pandemic, as recommended by the American Academy of Dermatology²⁹ and British Association of Dermatologists.³⁰

Concerning the use of remote consultations in general, remote care has potential to be a useful tool in addition to face-to-face consultations. Similar to studies investigating telemedicine, general satisfaction with remote consultations was high.³¹ However, we noted that caretakers experienced less emotional support during remote consultation. Therefore, extra attention should be given to emotional support when conducting remote care, especially when clinical images are provided.

In our study, almost a third would like to have more remote consultations in the future, particularly for regular follow-up visits and when the disease is controlled. This preference is in accordance with earlier findings that show that a third of patients preferred remote consultation over traditional face-to-face consultation³² and patients are interested in using remote consultation in the future.³³ Additionally, a relative small study demonstrated the effectiveness of remote consultation in patients with AD.²⁸ This finding is supported by systematic reviews and meta-analyses which demonstrate the effectiveness of remote care in general.²⁶ However, further research is needed to investigate implementation, challenges,^{34–36} and precise role of remote consultation in dermatology, in order to develop clear guidelines for dermatologists. The COVID-19 pandemic should be a call to adapt e-dermatology in dermatological practices, even in a post-COVID-19 era.

This study has some shortcomings that should be mentioned. A limitation of this study was the relatively small sample size and response rate. However, our non-responder analysis demonstrated no differences in age, sex, and consultation type. Furthermore, results of our study may overestimate satisfaction with received care. During the first COVID-19 wave, appreciation of health care was high³⁷ and caretakers understood difficulties of providing care, possibly leading to response bias. It would be interesting to repeat this study after the COVID-19 pandemic and compare differences in satisfaction. Finally, since patients were screened based on disease severity and individual preferences (i.e., patients with severe disease activity may have been more likely to receive face-to-face consultation or remote consultation with clinical images), direct comparison of these groups should be done with careful consideration.

In conclusion, the first wave of the COVID-19 pandemic had an unprecedented impact on the care for children with AD, particularly on the number of provided remote consultations. Effects on disease severity remained limited and overall satisfaction with care was high. However, caretakers considering their child to be vulnerable to COVID-19 were less satisfied with remote consultations. Extra attention should be given to emotional support during remote care with these families. Remote consultations seem to be a useful tool

that can be put into practice during the COVID-19 pandemic and in general.

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CONFLICT OF INTEREST

None declared.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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