

Imke NORDHORN^{1,a}
 Daniela WEISS^{2,a}
 Thomas WERFEL^{1,3}
 Alexander ZINK²
 Maximilian C. SCHIELEIN^{2,b}
 Stephan TRAILD^{1,3,b}

¹ Department of Dermatology and Allergy, Division of Immunodermatology and Allergy Research, Hannover Medical School, Hannover, Germany

² Department of Dermatology and Allergy, School of Medicine, Technical University of Munich, Munich, Germany

³ Cluster of Excellence RESIST (EXC 2155), Hannover Medical School, Carl-Neuberg-Straße 1, 30625 Hannover, Germany

Reprints: Stephan Traidl
 <traidl.stephan@mh-hannover.de>

The impact of the first COVID-19 wave on office-based dermatological care in Germany: a focus on diagnosis, therapy and prescription of biologics

Background: The COVID-19 pandemic has led to widespread changes in medical care. However, it is still unclear to what extent the care of patients suffering from moderate-to-severe psoriasis, chronic spontaneous urticaria or atopic dermatitis has been affected. **Objectives:** This study was conducted to determine the impact of the SARS-CoV-2 pandemic on medical care in dermatological practices, focusing on physicians' concerns related to susceptibility to infections in combination with different treatment modalities. **Materials & Methods:** Dermatologists working in medical offices in the German federal states of Bavaria and Lower Saxony participated in a cross-sectional, non-interventional, questionnaire-based study investigating the influence of COVID-19 on dermatological care. The study was performed after the first wave of the coronavirus pandemic in July/August, 2020. **Results:** A total of 195 dermatologists participated in the study. Almost one in five practices were closed for at least one week during the pandemic. The care of patients with chronic inflammatory skin diseases was impaired, affecting diagnostic investigation. Physicians stated that the pandemic substantially influenced systemic therapy. Nearly half of physicians surveyed were concerned about increased susceptibility to infections under biological therapy. No significant differences were identified between the German federal states of Bavaria and Lower Saxony in the south and north of Germany, respectively. **Conclusion:** This study reveals a significant impact of the COVID-19 pandemic on the care of dermatological patients in medical offices in Germany. New management modalities and continuous education are needed to improve care in pandemic situations.

Key words: COVID-19, chronic inflammatory skin diseases, biologics

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In December 2019, the first cases of coronavirus disease 2019 (COVID-19) were reported in Wuhan, China [1]. Following a pandemic spread, the novel enveloped RNA betacoronavirus was named "severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2). The first three European cases were reported in Germany and France on the 23rd and 24th January, 2020 [2]. Since then, SARS-CoV-2 has heavily affected both patients and physicians worldwide. This study was conducted in June, shortly after the first wave of the coronavirus pandemic in Germany, and the manuscript was prepared during the second wave in February, 2021. It has become clear that we must adapt to the challenging conditions, not just in daily life but also regarding patient care. In recent years, biologics have found their way into broad dermatological care [3, 4]. In 2003, efalizumab was the

first monoclonal antibody to be approved for the treatment of psoriasis, followed by a multitude of biologics targeting TNF α , IL-17a and its receptor, and IL-23 [5]. In 2014, the European Medicines Agency (EMA) approved omalizumab, a humanized monoclonal antibody recognizing the Fc portion of IgE, for the treatment of chronic spontaneous urticaria (CU) [6]. A new era in the treatment of atopic dermatitis (AD), one of the most common chronic inflammatory skin diseases, started with the approval of dupilumab, a human monoclonal antibody inhibiting IL-4 and IL-13 signalling [7, 8]. According to the guidelines for psoriasis, CU and AD, biologics are indicated for refractory and moderate-to-severe forms, or cases with considerable impact on quality of life [3, 4, 9-11]. As these treatments affect the immune response, concerns regarding susceptibility to infections including viral infections are frequently discussed [12]. An increased risk of severe bacterial and viral infections has been described for TNF α inhibitors [13, 14]. In Phase III studies of IL-17 inhibitors, an increased risk of upper airway and fungal infections was observed

^a These authors contributed equally

^b These authors contributed equally

[15-17]. In contrast, the IL-23 inhibitors, omalizumab and dupilumab, were not associated with an increased risk of severe infections in randomized placebo-controlled trials [18-22].

Regarding the current coronavirus pandemic, both German and European dermatological societies recommended to continue treatment with biologics as usual in patients without suspected or proven SARS-CoV-2 infection [23-25]. The reasoning is based on adequate disease control being important for patients' quality of life and positive effects on the COVID-19 related cytokine storm [23-27]. Additionally, topical treatments, such as corticosteroids and calcineurin inhibitors, were advised to be used as recommended in the guidelines despite the spread of SARS-CoV-2 [25]. However, it remained unclear to what extent these recommendations were followed in dermatological care in medical offices.

The aim of this study was to investigate the influence of the coronavirus pandemic on dermatological routine care in medical offices in Lower Saxony and Bavaria. The study focused, in particular, on how concerns of increased susceptibility to viral infection influenced practitioners' usage of biologics in dermatological patients.

Methods

Dermatologists with a medical office in Bavaria (Southern Germany) and Lower Saxony (Northern Germany) were included in this non-interventional, questionnaire-based cross-sectional study between July and August, 2020.

The anonymised questionnaire consisted of general characteristics (gender, age, work place), information about prescription behaviour regarding biologics for moderate-to-severe psoriasis, CU and moderate-to-severe AD, and was literature based [28]. It was complemented by specific coronavirus pandemic questions covering medical care in dermatological practices during the first wave of the pandemic. The questions also covered general care of dermatological practice and care of patients with moderate-to-severe psoriasis, CU and AD. Furthermore, the influence on diagnostic investigations, therapies and potential concern of patients' susceptibility to infections under biological treatment were investigated. These questions regarding the coronavirus pandemic were answered on a five-point Likert scale (agree-rather agree-undecided-rather disagree-disagree). In addition, physicians were asked about the percentage of patients who had contacted them regarding susceptibility to viral infection due to biological treatment (*see supplementary material*). The initial version of the questionnaire was evaluated by 10 experienced dermatologists from the Department of Dermatology and Allergy of the Technical University of Munich and Department of Dermatology and Allergy of Hannover Medical School, and was subsequently amended.

The study was conducted in accordance with the principles of the Declaration of Helsinki and good clinical practice guidelines, and approved by the ethics committees of the Hannover Medical School and the Technical University of Munich (No. 9123_BO_K2020 and 361/20 S).

The selection of dermatologists was made using the official website of physician databases of the Bavarian and Lower Saxony Association of Panel Doctors ("Kassenärzt-

liche Vereinigung Bayerns / Niedersachsens", accessed: 18th June 2020). Each physician listed in the databases was addressed separately and received a cover letter, study information outline and the questionnaire, accompanied by a consent form and an envelope for returning the study documents free of charge after completion. After one week, all dermatologists received a reminder letter.

The data were digitalised using REDCap (Research Electronic Data Capture) [29]. Each questionnaire was entered twice and discrepancies were corrected. Descriptive data were generated for each variable. Age was stratified in groups yielding approximately equal group sizes. In order to cluster the descriptive data, the Likert scale categories "agree" and "rather agree" were classified as "agree", "undecided" as "partly agree", and "rather disagree" and "disagree" were grouped as "disagree". In univariate analysis, perceived influencing factors of the Likert scale were coded as "agree" and "disagree". Physicians who were at least undecided were coded as "agree". To identify associated factors, logistic regression analyses were performed for perceived influencing factors on prescription of biologics and physicians' concern about viral infection regarding their patients under biological treatment. Physician characteristics (gender, state, age) and variables for medical care during the coronavirus pandemic were entered as dependent variables and examined in a univariate analysis. Additionally, a multivariate logistic regression using backward selection was performed. P values below 0.05 were considered as significant. SPSS, version 27 (IBM) was used for statistical analysis.

Results

In the present study, 608 dermatologists in Bavaria and 350 in Lower Saxony were invited to participate. Of these 958 contacted dermatologists, 195 completed the questionnaire (50.3% female; mean age: 52.8 ± 9.1 years; response rate: 20.4%). The population characteristics (gender, age, workplace and years worked in dermatological office) were comparable in both federal states (*table 1*).

Regarding the effect of the coronavirus pandemic on dermatological practices, 35 of 195 physicians (18%) closed their practices for at least one week due to the pandemic (*figure 1*). There was no gender-specific, age-related or federal state-dependent effect on the closure of dermatological offices. The most common reasons for practice closure were an absence of patients and a lack of ability to comply with hygiene regulations (29% for both), followed by concern about COVID-19 infection (25%). Less frequently, the practices were closed because of SARS-CoV-2 infections amongst practitioners and practice employees (6% for both).

The potential impact of the pandemic on the medical care of patients with moderate-to-severe psoriasis, CU and moderate-to-severe AD was investigated in detail. Overall, 15.0% of the dermatologists reported impaired treatment of moderate-to-severe psoriasis patients and 16.6% partial impairment (*figure 2*). In comparison, less impairment was seen for medical care of moderate-to-severe AD, with 8.6% stating impairment and 14.1% partial impairment. Of the dermatologists, 81.2% stated that the coronavirus pandemic had no effect on the care of CU.

Table 1. Population characteristics.

	Overall		Bavaria		Lower Saxony	
	[%]	[n]	[%]	[n]	[%]	[n]
Overall	100	195	100	115	100	80
Gender						
Women	50.3	98	46.1	53	56.3	45
Men	49.2	96	53.9	62	42.5	34
Workplace						
Single practice	47.7	93	48.7	56	46.3	37
Joint practice	46.7	91	44.3	51	50.0	40
Medical centre	5.6	11	7.0	8	3.8	3
Age of dermatologist (mean and SD)		52.8 ± 9.1		52.6 ± 8.6		53.1 ± 9.7
≤45 years	23.1	45	20.9	24	26.3	21
46-55 years	35.4	69	33.0	38	38.8	31
≥56 years	39.0	76	41.7	48	35.0	28
Years worked in a private practice (mean and SD)		16.7 ± 9.0		16.4 ± 8.8		17.1 ± 9.3
≤10 years	27.7	54	27.0	31	28.8	23
11-20 years	34.4	67	36.5	42	31.3	25
≥21 years	32.8	64	31.3	36	35.0	28

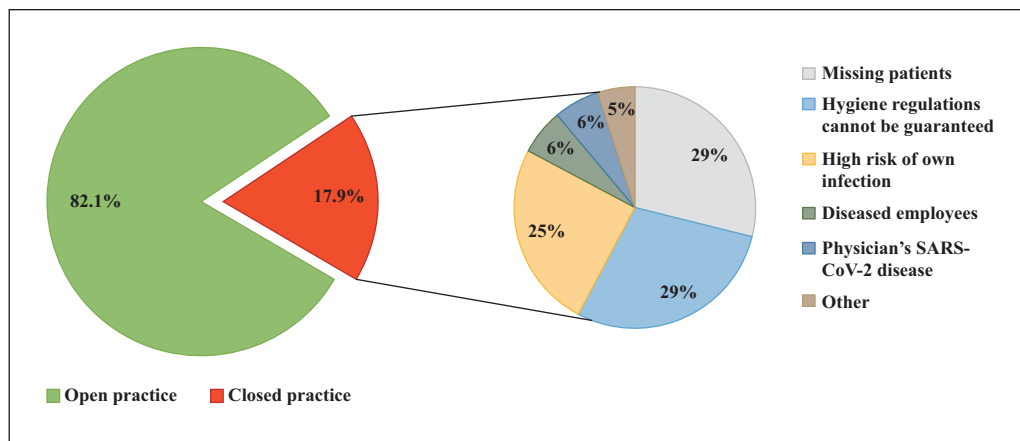


Figure 1. Influence of the coronavirus pandemic on dermatological practices in Bavaria and Lower Saxony showing the proportion of dermatologists stating that their practice was closed for at least one week due to SARS-CoV-2 ($n = 195$) and the reasons for closure of each dermatological practice ($n = 35$).

Additionally, physicians were asked about the influence of the coronavirus pandemic on different types of treatment and diagnostic investigations (figure 3A). About a quarter of the participating dermatologists (26.9%) reported that the coronavirus pandemic had influenced the choice of systemic therapy; 16.7% of physicians stated a partial influence. In contrast, the pandemic had a smaller impact on topical therapy; 6.4% of dermatologists indicated a subjective influence on the choice of topical therapy, and 3.2% a partial subjective influence. Furthermore, 16.0% of physicians stated a reduction of diagnostic investigations. More than one in five dermatologists (22.1%) reported reduced prescription of biologics, of whom 15.1% reported a considerable reduction, and 7.0% a moderate reduction. The association of potentially associated factors of prescription behaviour is shown in figure 3B.

Focussing on factors that may be associated with prescription of biologics at the time of the coronavirus pandemic

revealed that age of dermatologists had a significant impact on biologic prescription. Dermatologists aged 45 years or younger prescribed significantly fewer biologics than those between 46 and 55 years (44.2% vs. 15.2%; $p = 0.001$) and those aged 56 or older (16.9%; $p = 0.002$), respectively (table 2A). A strong predictor for less prescription of biologics was found in the extent of diagnostic investigation. Physicians who reported fewer diagnostic investigations during the pandemic prescribed fewer biologics than the comparison group (38.0% vs. 16.3%, $p = 0.002$). Another association was observed between physicians who mentioned an influence on the choice of systemic therapy due to the coronavirus pandemic and less prescription of biologics (38.7% vs. 9.6%, $p < 0.001$). Significantly fewer biologics were prescribed by physicians reporting impaired treatment of patients with moderate-to-severe psoriasis (48.3% vs. 10.2%; $p < 0.001$) as well as AD (50.0% vs. 14.2%; $p < 0.001$) and CU (51.4% vs. 15.4%; $p < 0.001$).

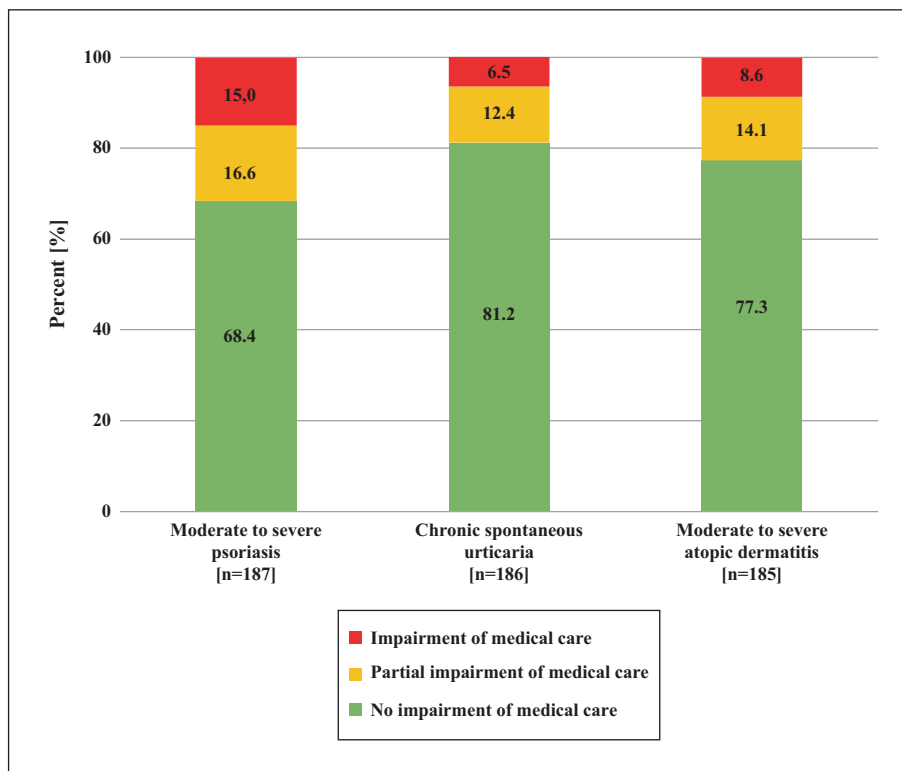


Figure 2. Physicians' response regarding impairment of medical care due to the coronavirus pandemic, related to care for moderate-to-severe psoriasis, chronic spontaneous urticaria and moderate-to-severe atopic dermatitis.

The multivariate logistic regression (*table 2B*) focused on different associated factors that led to a reduction in the prescription of biologics due to the coronavirus pandemic. Physicians who stopped the biological treatment of their patients during the pandemic (adjusted Odds Ratio (aOR): 5.75; confidence intervals [95% CI]: 1.68-19.61) and physicians who stated an influence on the choice of systemic therapy (aOR: 5.90; 95% CI: 2.30-15.14) were more likely to state an influence on their behaviour in prescribing biologics. Additionally, physicians reporting impaired medical care of psoriasis (aOR: 2.74; 95% CI: 0.95-7.88) or CU (OR: 3.45; 95% CI: 1.09-10.89) stated that they prescribed fewer biologics during the pandemic.

This study also examined whether physicians were concerned that prescribed biologics might increase a patient's susceptibility to coronavirus infection (*figure 4*). Almost half of the physicians surveyed (46.5%) expressed concerns about increased susceptibility to infection during the coronavirus pandemic. *Table 3* lists every possible predictor of concern about susceptibility to infection. Female dermatologists were significantly more concerned about viral susceptibility than their male colleagues (54.3% vs. 38.0%; $p=0.027$). Furthermore, physicians who reported an impairment of medical care for moderate-to-severe psoriasis, CU, or AD were significantly more concerned about viral susceptibility (psoriasis: 67.8% vs. 36.7%, $p < 0.001$; CU: 65.7% vs. 41.7%, $p=0.012$; AD: 66.7% vs. 39.9%, $p=0.003$). We could also identify a further influencing factor with regard to the barriers against prescribing biologics; those physicians who stated concerns about the safety of biologics were also more concerned about the increased

susceptibility to infection due to biologics (71.1% vs. 40.3%; $p=0.001$).

Furthermore, 21 out of 190 (11.1%) physicians stated that they had discontinued at least one biological treatment during the pandemic. The discontinuation was more frequent in physicians exhibiting concerns about increased susceptibility to infections (71.4% vs. 43.6%; $p=0.021$). A similar effect was seen in the behaviour of prescription of biologics and the extent of diagnostic investigations; dermatologists who prescribed fewer biologics (73.2% vs. 38.2%; $p < 0.001$) and those who made fewer diagnostic investigations due to the pandemic (58.8% vs. 41.9%; $p=0.040$) were significantly more concerned about susceptibility to infection.

The multiple logistic regression (*table 3B*) focused on the impact of gender on concern about susceptibility to infection: Female dermatologists were more concerned about an increased risk of infection due to increased susceptibility (aOR: 1.78; 95% CI: 0.91-3.51). Physicians reporting impaired psoriasis treatment (aOR: 2.88; 95% CI: 1.34-6.16) or an influence on the choice of systemic therapy (aOR: 3.13; 95% CI: 1.57-6.23) were also more likely to express these concerns. Additionally, the discontinuation of biologics (aOR: 2.88; 95% CI: 0.88-9.52) and concerns about the safety of biologics (aOR: 3.62; 95% CI: 1.51-8.67) were factors associated with increased concern about susceptibility to infection.

In order to estimate the concern about susceptibility to infections from the patient's perspective, we asked dermatologists how many of their patients treated with biologics had contacted them regarding this topic (*figure 5*).

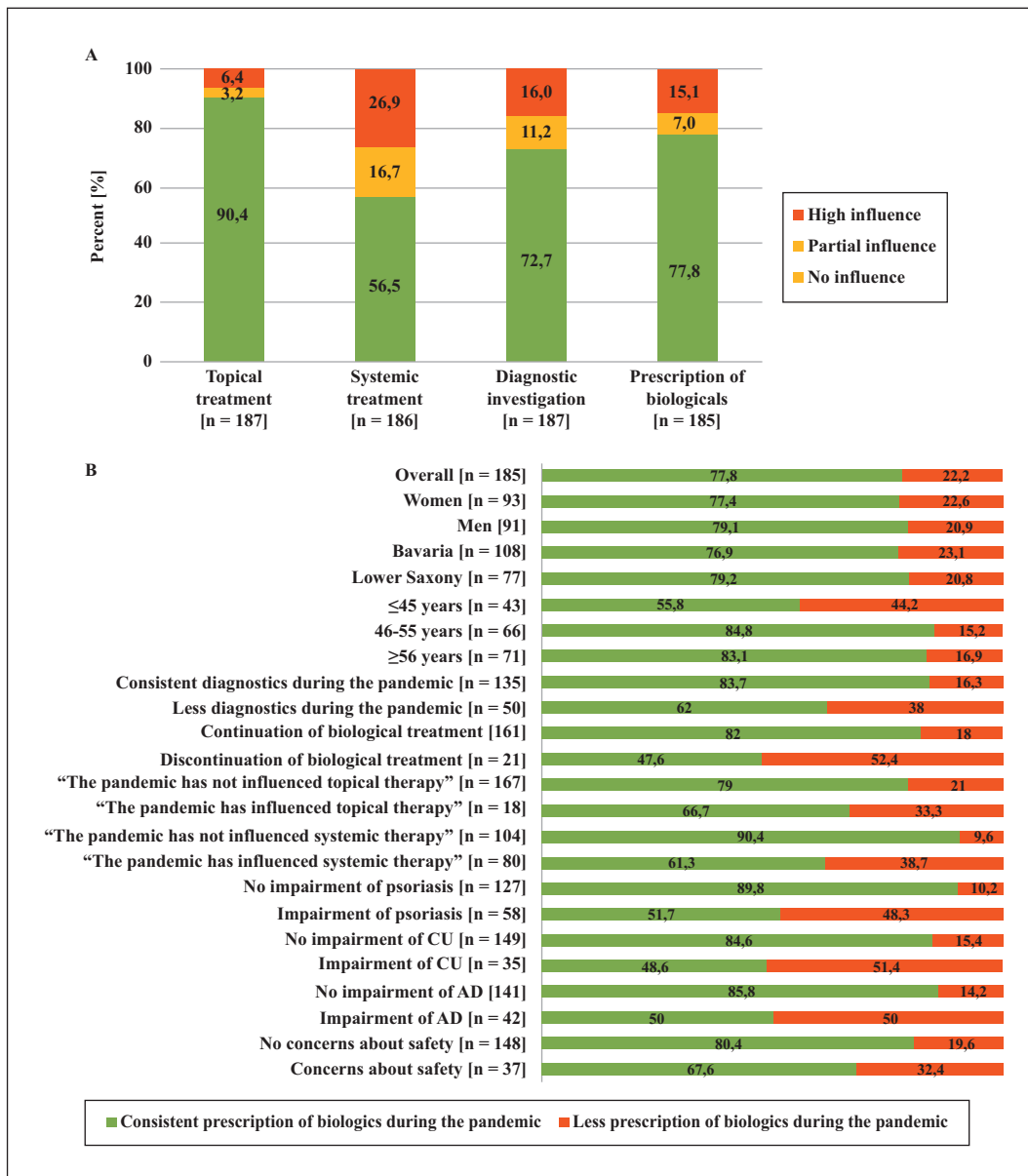


Figure 3. The effect of the coronavirus pandemic on diagnostic investigation and treatment in dermatological practices. **A)** Perceived influence of the coronavirus pandemic on topical and systemic therapy, extent of diagnostic investigation and prescription of biologics. **B)** Perceived influence on the prescription of biologics at the time of the coronavirus pandemic.

In psoriasis patients, the concerns regarding infections were more frequent than in CU and AD patients. In total, 65.4% of physicians were contacted by any of their psoriasis patients, whilst only 14.7% and 24.7% were contacted by patients with CU and AD, respectively.

Discussion

The aim of this study was to identify the impact of the coronavirus pandemic on dermatological care in medical offices with regard to diagnosis, therapy and prescription behaviour in Bavaria and Lower Saxony.

Nearly one in five office-based dermatologists closed their medical office for at least one week during the pandemic. To ensure adequate care for patients, changes were made to practice management, such as an increased use of telemedicine concepts, as previously reported by Elsner in German dermatologists [30].

Interestingly, despite both the prevalence and incidence of COVID-19 being significantly higher in Bavaria than in Lower Saxony prior to this project, no differences in diagnostic investigation, therapy or concerns for coronavirus susceptibility were noted between the two states [31]. One can assume that although the regulatory measures were partly decided by each federal state, the concerns of dermatologists were mainly driven by the situations in the respective areas.

Table 2. A) Univariate analysis of perceived influence on the prescription of biologics at the time of the corona pandemic. Significance was calculated using binary logistic regression. **B)** Multivariate analysis of perceived influencing factors for less prescription of biologics. Odds ratios and 95% confidence interval were calculated using LR backward selection.

A	Consistent prescription of biologics during the pandemic		Less prescription of biologics during the pandemic		p value	Odds ratio 95% CI
	[%]	[n]	[%]	[n]		
Overall [n = 185]	77.8	144	22.2	41	-	-
Gender						
Women [n = 93]	77.4	72	22.6	21	-	-
Men [n = 91]	79.1	72	20.9	19	0.780	0.91 [0.45-1.82]
Federal state of Germany						
Bavaria [n = 108]	76.9	83	23.1	25	-	-
Lower Saxony [n = 77]	79.2	61	20.8	16	0.702	1.15 [0.57-2.33]
Age of dermatologist						
≤45 years [n = 43]	55.8	24	44.2	19	-	-
46-55 years [n = 66]	84.8	56	15.2	10	0.001	0.23 [0.09-0.56]
≥56 years [n = 71]	83.1	59	16.9	12	0.002	0.26 [0.12-0.61]
Extent of diagnostic investigations						
Consistent [n = 135]	83.7	113	16.3	22	-	-
Fewer [n = 50]	62.0	31	38.0	19	0.002	3.15 [1.52-6.54]
Biological therapy						
Continuation of biological treatment [n = 161]	82.0	132	18.0	29	-	-
Discontinuation of biological treatment [n = 21]	47.6	10	52.4	11	0.001	5.01 [1.94-12.9]
Influence of the pandemic on therapy						
“The corona pandemic has not influenced topical therapy.” [n = 167]	79.0	132	21.0	35	-	-
“The corona pandemic has influenced topical therapy.” [n = 18]	66.7	12	33.3	6	0.236	1.89 [0.66-5.38]
“The pandemic has not influenced systemic therapy.” [n = 104]	90.4	94	9.6	10	-	-
“The corona pandemic has influenced systemic therapy.” [n = 80]	61.3	49	38.7	31	<0.001	5.95 [2.69-13.13]
Medical care for patients with psoriasis, CU and AD						
No impairment for psoriasis [n = 127]	89.8	114	10.2	13	-	-
Impairment for psoriasis [n = 58]	51.7	30	48.3	28	<0.001	8.19 [3.79-17.70]
No impairment for CU [n = 149]	84.6	126	15.4	23	-	-
Impairment for CU [n = 35]	48.6	17	51.4	18	<0.001	5.80 [2.61-12.88]
No impairment for AD [n = 141]	85.8	121	14.2	20	-	-
Impairment for AD [n = 42]	50.0	21	50.0	21	<0.001	6.05 [2.81-13.04]
Barriers to prescription of biologics						
No concerns about safety [n = 148]	80.4	119	19.6	29	-	-
Concerns about safety [n = 37]	67.6	25	32.4	12	0.096	1.97 [0.89-4.38]
B			OR			95% CI
Medical care for patients under biological therapy						
Discontinuation of biological treatment			5.75			1.68-19.61
Influence of the pandemic on therapy						
“The corona pandemic has influenced the choice of systemic therapy.”			5.90			2.30-15.14
Medical care for patients with psoriasis and CU						
Impairment for psoriasis			2.74			0.95-7.88
Impairment for CU			3.45			1.09-10.89

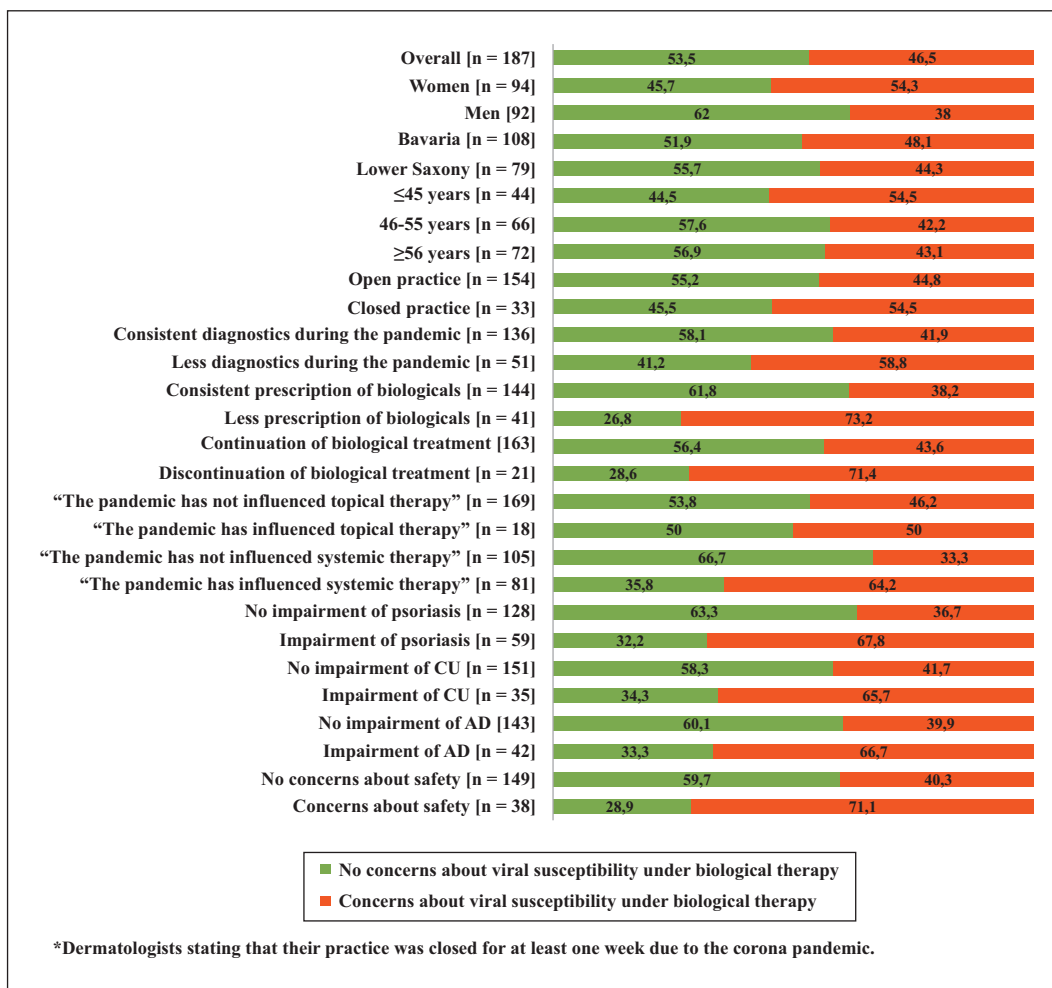


Figure 4. Perceived influencing factors associated with concern about susceptibility to infection under biological treatment from the physician's point of view at the time of the pandemic.

Furthermore, physicians stated a substantial influence of the pandemic on the prescription of biologics. Approximately one in 10 dermatologists reported to have discontinued biological treatment. This is in accordance with other perspective patient data on discontinuation of biologics [12]. In addition, almost half of the physicians stated increased concerns about susceptibility to infections under biological treatment. Regarding psoriasis, the first biologics approved for treatment belong to the group of TNF blockers. These have previously been shown to induce susceptibility to infections [32]. The concerns regarding an increased risk of infection due to biologics, in general, are possibly based on the assumption that this increased susceptibility would also apply to other classes of biologics. Whilst IL-17 inhibitors can increase susceptibility to fungal infection, IL-23 inhibition has not been associated with an increased occurrence of infections of any kind. Most recently, Mahil *et al.* published an investigation of 374 clinician-reported patients with psoriasis and COVID-19 infection. Of note, psoriasis patients using non-biological systemic therapy, such as methotrexate, showed a 2.8-fold higher chance of hospitalization than those using biologics (OR: 2.84) [33]. The authors provided a possible explanation in a separate study that analysed risk behaviour in 2,869 psoriasis patients from 74 countries based on a self-reporting survey

[34]. Patients receiving targeted therapies showed greater risk-mitigating behaviour than patients without systemic therapy and non-biologics.

Regarding AD, it is known that AD patients suffer more frequently from upper respiratory infections, chest colds and influenza [35, 36]. However, as yet, there does not appear to be an increased prevalence of COVID-19 in AD patients. In November 2020, baricitinib was approved as the first janus kinase (JAK) inhibitor for the treatment of AD [37]. Meta-analyses have demonstrated an increased frequency of varicella-zoster virus infection in baricitinib-treated patients [38], however, baricitinib seems to have a positive impact on patients with severe COVID-19 by preventing a cytokine storm [39]. Milder courses of COVID-19 were also noted in AD patients receiving dupilumab, which could be due to the immunomodulatory effect of the biologic [40]. Similar positive effects were reported for dupilumab for non-herpetic skin infection and severe bacterial infections [41].

Regarding CU, treatment with omalizumab is advised if antihistamines are not sufficient in controlling disease [6]. Concern for viral susceptibility among patients was shown to be lowest among those with CU. This could be due to the fact that the very low level of side effects is usually pointed out in the information provided when

Table 3. A) Perceived influencing factors associated with concerns about susceptibility to infection under biological treatment from the physician's point of view. Significance was calculated using binary logistic regression. **B)** Multivariate analysis of perceived influencing factors associated with concerns about susceptibility to infection. Odds ratios and 95% confidence interval were calculated using LR backward selection.

A	No concerns about viral susceptibility under biological therapy		Concerns about viral susceptibility under biological therapy		p value	OR 95% CI
	[%]	[n]	[%]	[n]		
Overall [n = 187]	53.5	100	46.5	87	-	-
Gender						
Men [n = 92]	62.0	57	38.0	35	-	-
Women [n = 94]	45.7	43	54.3	51	0.027	1.93 [1.08-3.46]
Federal state of Germany						
Bavaria [n = 108]	51.9	56	48.1	52	-	-
Lower Saxony [n = 79]	55.7	44	44.3	35	0.603	1.17 [0.65-2.09]
Age of dermatologist						
≤45 years [n = 44]	44.5	20	54.5	24	-	-
46-55 years [n = 66]	57.6	38	42.4	28	0.213	0.61 [0.29-1.32]
≥56 years [n = 72]	56.9	41	43.1	31	0.230	0.63 [0.30-1.34]
Medical care of the practice						
Open practice [n = 154]	55.2	85	44.8	69	-	-
Closed practice [n = 33]*	45.5	15	54.5	18	0.310	1.48 [0.70-3.15]
Extent of diagnostic investigation during the pandemic						
Consistent [n = 136]	58.1	79	41.9	57	-	-
Less [n = 51]	41.2	21	58.8	30	0.040	1.98 [1.03-3.81]
Prescription of biologics						
Consistent [n = 144]	61.8	89	38.2	55	-	-
Less [n = 41]	26.8	11	73.2	30	<0.001	4.41 [2.05-9.52]
Biological therapy						
Continuation of biological treatment [n = 163]	56.4	92	43.6	71	-	-
Discontinuation of biological treatment [n = 21]	28.6	6	71.4	15	0.021	3.24 [1.20-8.77]
Influence of the pandemic on therapy						
"The corona pandemic has not influenced the choice of topical therapy." [n = 169]	53.8	91	46.2	78	-	-
"The corona pandemic has influenced the choice of topical therapy." [n = 18]	50.0	9	50.0	9	0.756	1.17 [0.44-3.08]
"The corona pandemic has not influenced the choice of systemic therapy." [n = 105]	66.7	70	33.3	35	-	-
"The corona pandemic has influenced the choice of systemic therapy." [n = 81]	35.8	29	64.2	52	<0.001	3.59 [1.95-6.59]

Table 3. (Continued).

A	No concerns about viral susceptibility under biological therapy		Concerns about viral susceptibility under biological therapy		p value	OR 95% CI
	[%]	[n]	[%]	[n]		
Medical care for patients with psoriasis, CU and AD						
No impairment for psoriasis [n = 128]	63.3	81	36.7	47	-	-
Impairment for psoriasis [n = 59]	32.2	19	67.8	40	<0.001	3.63 [1.89-6.98]
No impairment for CU [n = 151]	58.3	88	41.7	63	-	-
Impairment for CU [n = 35]	34.3	12	65.7	23	0.012	2.68 [1.24-5.78]
No impairment for AD [n = 143]	60.1	86	39.9	57	-	-
Impairment for AD [n = 42]	33.3	14	66.7	28	0.003	3.02 [1.46-6.22]
Barriers to prescription of biologics						
No concerns about safety [n = 149]	59.7	89	40.3	60	-	-
Concerns about safety [n = 38]	28.9	11	71.1	27	0.001	3.64 [1.68-7.89]
B						
Gender						
Women				1.78		0.91-3.51
Medical care for patients under biological therapy						
Discontinuation of biological treatment				2.88		0.88-9.52
Influence of the pandemic on therapy						
“The corona pandemic has influenced the choice of systemic therapy.”				3.13		1.57-6.23
Medical care for patients with psoriasis						
Impairment of psoriasis				2.88		1.34-6.16
Barriers to prescription of biologics						
Concerns about safety				3.62		1.51-8.67

*Dermatologists stating that their practice was closed for at least one week due the corona pandemic.

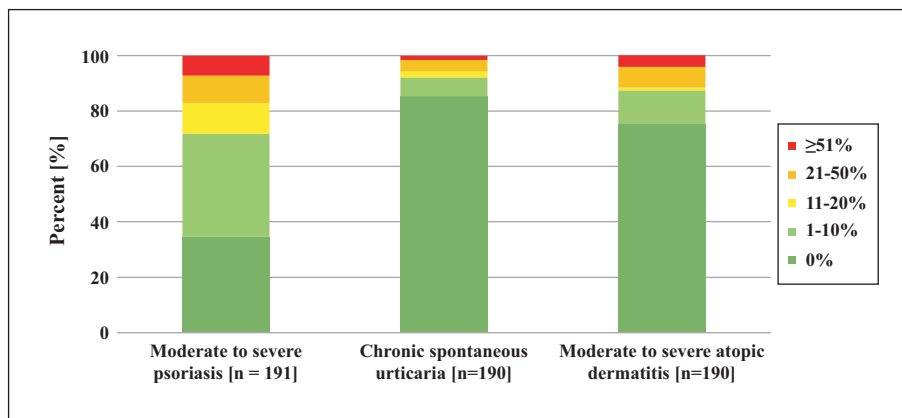


Figure 5. Effect of the coronavirus pandemic on concerns for susceptibility to infection from the patient's point of view, as reported by their dermatologists. Dermatologists reported the extent of concern for viral infection in patients treated with biologics for psoriasis, urticaria and atopic dermatitis, based on responses categorised into five groups: none, 1-10, 11-20, 21-50 and $\geq 51\%$.

therapy is initiated. Furthermore, it could be hypothesized that during patient communication, IgE and the corresponding blockade are understood as an intervention via an allergic mechanism, meaning patients do not perceive a potential impairment to viral defence. Similar results were found by Kocatürk *et al.* analysing the care of CU patients in specialized centres [42]. The authors were able to show that in contrast to cyclosporine and systemic steroids, antihistamines and omalizumab were used just as frequently as before the pandemic. Of note, severely impaired care for CU patients was reported most prominently as a result of reduced patient referrals and hours in the clinic. More than one-third of SARS-CoV-2 positive CU patients experienced an exacerbation of urticaria. However, the CU had no impact on COVID-19 disease. Thus, there is a need to educate dermatologists treating CU patients of likely exacerbation of CU during COVID-19 infection.

Even though positive effects of biologics on the cytokine storm during COVID-19 infection have been described, according to current knowledge it does not seem reasonable to start biological treatment in the case of active COVID-19 infection. Therefore, in addition to testing for tuberculosis and hepatitis B and C, some authors recommend excluding COVID-19 infection via a screening test before starting biological therapy [43].

Our study shows a clear impact of the coronavirus pandemic on diagnosis, therapy and general care of dermatological patients. In 2014, Zuberbier *et al.* reported immense costs generated by inadequate disease management of allergic diseases, such as AD [44]. This includes direct, indirect, intangible and opportunity costs. AD-related high out-of-pocket costs, in particular, represent a considerable burden for patients [45]. Furthermore, inadequate or no therapy leads to impairment of the quality of life in patients with AD, psoriasis and CU [46-48]. It therefore seems that during the coronavirus pandemic, sufficient disease therapy, mainly conducted by dermatologists, is an important aspect of disease management, both economically and for the patient.

Conducting this study in two federal states of Germany lends strength by allowing differences across the north and south of Germany to be assessed. A potential limitation of the study is the possibility of selection bias due to

voluntary participation of physicians. Whilst measures, such as a concise questionnaire and prepaid return envelopes, were taken, disinterest in current research or non-use of biologics might have led to a biased sample. Furthermore, only three exemplary chronic skin diseases were investigated. However, these are the three most common skin diseases that require systemic therapy. Additionally, an adequate response rate, as in our study (20.4%), would not have been achieved if the questions had been too extensive. Furthermore, the anonymised approach of this investigation is highly likely to have minimised a social desirability bias. Overall, this study can help to improve dermatology practice standards, as well as optimise the care for dermatological patients. Even though vaccines against SARS-CoV-2 are now available, the consequences of the coronavirus pandemic may continue long after the pandemic resolves [49, 50]. The pandemic may have consequences for care in dermatological practices and new management modalities, such as digital concepts with telemedical care. Adequate care for dermatological patients is important and concerns about increased susceptibility to infection from both dermatologists' and their patients' perspectives should be taken seriously and potentially require advanced training. ■

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Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1684/ejd.2022.4222.

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