Prospective Study

# Patients with Chronic Pain Prefer Maintenance of Pain Treatment Despite COVID-19 Pandemic Restrictions

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**Background:** Worldwide, the COVID-19 pandemic has a significant impact on daily life. First studies describe a negative impact of pandemic stressors even on individuals without previous mental illnesses. The home lockdown and the shutdown of pain clinics make it difficult for all patients to get the healthcare they need.

**Objectives:** The aim of this study was to investigate to what extent patients with chronic pain felt affected by the pandemic and its consequences on pain treatments, focussing on the beginning of the outbreak.

**Study Design:** A prospective noninterventional study.

**Setting:** Medical University Center .

**Methods:** One-hundred and forty-nine patients, suffering from chronic pain, treated at a large German interdisciplinary pain center, were studied over a period of 2 months at the beginning of the pandemic. Data from patient charts and questionnaires were evaluated. Patients were asked about postponements or cancellations of pain therapy, the possible effect on pain levels, depression, anxiety and stress, and the impact of intensified hygiene measures. Results were compared to those from standardized and validated questionnaires from the same patients (German version of the depression, anxiety, and stress scale = DASS) at the time of the first contact in the pain clinic.

**Results:** Eighty-four (56.4%) patients reported cancelled or postponed treatments during the pandemic. Those chronic pain patients with delayed or cancelled treatments reported significantly more pain and psychological distress. The delay or discontinuation of treatments resulted in a deterioration of symptoms. From the patients' point of view this deterioration was unrelated to the timing of treatment and not secondary to increased hygiene measures. In both groups, patients showed a significant amelioration of the DASS values compared to the values they had at the beginning of treatment, despite the negative effects of the COVID-19 pandemic on care structures. The majority of the patients do not think that the quality of pain treatment was significantly affected by the intensified hygiene requirements.

**Limitations:** The limitations of the study are the small number of patients because of the limitation to a short period of time at the beginning of the pandemic and the return rate of 40.2% of the study consents.

**Conclusions:** Even in the event of a pandemic-related restriction of the care structures, patients with chronic pain benefit from pain therapy. Limitations such as the increased hygiene measures caused by the pandemic were not considered detrimental to the therapeutic measures.

**Key Words:** COVID-19 pandemic, hygiene measures, chronic pain, anxiety, depression, stress

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The COVID-19 pandemic is a global health crisis with many socioeconomic and health consequences. The lockdowns imposed by governments, the quarantine at home and the intensified hygiene measures made access to health facilities, such as hospitals, outpatient clinics, and

medical offices, more difficult. For fear of infection, many patients rarely sought medical help, even when they had serious health problems. At the beginning of the pandemic, the number of daily consultations in all emergency rooms decreased by up to 40% in Germany. Similar trends were also evident in comparable surveillance systems of other European countries and in the United States of America (1,2). To this day, the pandemic shutdown affects chronic pain management worldwide with an additional impact on patients' psychological health (3).

Guidelines and consensus recommendations have been drawn up for interventionalists and pain therapists (4,5) in order to avoid an undertreatment of pain patients resulting in negative impacts on mobility, quality of life, and opioid use, and to strengthen the fact that good care of pain patients should be a top priority (6). Shanthanna et al (5) suggested that no elective pain procedures should be performed for safety reasons and to prevent SARS-CoV-2 infections. Urgent and semi-urgent pain procedures were to be deferred. Pain consultations were to be performed preferably online and clinical settings were to adhere to physical distancing (5). Contrary to these recommendations, a call for action for mental health science was proclaimed to be central to the international response to the COVID-19 pandemic with regard to mental health issues (7). Accordingly, Cohen et al (8) stated that the relevance of pain management is underestimated in austere environments or in times of crisis. The American Society of Interventional Pain Physicians (ASIPP) published an evidence-informed guidance for triaging interventional pain procedures and an evidence-based guideline on risk reduction and stratification to ensure safe interventional pain practices (9,10). Besides, significant psychological effects on health professionals involved in the management of patients with chronic pain have also been reported (11).

Alternatives like telemedicine, email, and eHealth systems were suggested as strategies to overcome limitations in delivering adequate care to chronic pain patients in this crisis. But the evidence of efficacy of these methods in chronic pain is still lacking, and the elderly often cannot cope with the required technologies (3).

At this point, we already know that the current COVID-19 pandemic may act as a psychosocial stressor. Up to 50% of the German general population experienced a negative impact on their mood, especially on anxiety. Fears regarding COVID-19 related more to social than to personal aspects (12). In general, chronic pain patients have a higher prevalence of depression, anxiety, and stress vulnerability (13-15) and it is well-known that there is a bidirectional relationship between chronic pain and mental health disorders (16). If psychological stress factors worsen because of a pandemic, it is likely that pain will also increase. Deterioration in pain care can result in long-lasting deterioration of the pain disorder. This situation could have severe implications because chronic pain patients have the highest global morbidity, measured by years lived with a disability (17).

This study is intended to elucidate the consequences of a lack of support due to cancelled doctor's appointments or delayed treatments for patients suffering with chronic pain. In addition, the impact of the pandemic-related restrictions in medical care and increased hygiene measures (such as wearing of a nose and mouth mask or social distancing) on quality of care and on pain and mood were assessed.

If and to what extent pain therapy should be performed in case of a pandemic can only be answered by weighing the consequences and the increased risk of infection versus secondary health damage due to cancelled or postponed treatments. While the risk of infection can only be estimated based on local epidemiological data, there is only little knowledge to date about the individual consequences of cancelled or postponed pain treatment, on both pain intensity and psychological distress.

## Methods

This study was approved by the Ethics Committee of the University of Freiburg and was performed in accordance with the Declaration of Helsinki.

### Sample and Data Collection

Adult chronic pain patients treated or scheduled to be treated as outpatients, or inpatients in the Interdisciplinary Pain Center (IPC), Medical Center of the University of Freiburg , between March 15 and May 15, 2020 were included in the study. Some patients were treated with an interdisciplinary multimodal pain therapy over a period of 3 to 5 weeks. These treatments are defined by a high treatment intensity, standardized group sizes (closed groups), standardized treatment approaches, and are based on the biopsychosocial model (18-20). Interventional therapies are integrated into the program. Exclusion criteria were inadequate German language skills and age younger than 18 years.

These criteria were fulfilled by 376 patients. Information about the study, the informed consent form, and the questionnaires were sent by mail to these patients (Fig. 1).

Appointments for patients with interventional treatments or high risk patients were cancelled if necessary in accordance with hospital regulations. Cancellations by patients themselves were not documented.

The questionnaires were completed together with the patient during a telephone call after receipt of the patient's written consent to the study. A telephone interview was held with 149 patients. All patients participated voluntarily and received no reimbursement.

### Questionnaires

The questionnaires included those in Fig. 2 and the DASS questionnaire (Depression Anxiety and Stress Scale) (21,22).

Additionally, we extracted sociodemographic variables (gender and age), the mean and maximum pain (Numeric Rating Scale), the results of the German version of the DASS (23-25) from the German pain questionnaire (26), which the patients completed at their first assessment in the IPC. Furthermore, we recorded whether the patients had received interdisciplinary pain treatment during the survey period.

### Statistical Analysis

The statistical analysis was performed using SPSS software version 27 (IBM Corporation, Armonk, NY). Before analyzing, the normal distribution of data was tested using Kolmogorov-Smirnov tests ($P \geq 0.05$). Because normal distribution was lacking, we used nonparametric statistical tests like the Mann-Whitney U-test and the Spearman-rho correlation. A $P$-value $\leq 0.05$ was considered to indicate a significant difference.

### Hygiene Measures

Immediately after the onset of exponentially rising numbers of COVID-19 infections in Germany, strict hygiene measures were implemented throughout the Medical Center of the University of Freiburg. The hygiene measures for all patients who presented or were treated at the IPC included:

- Every patient was asked about typical symptoms of a COVID-19 infection one day before presentation and was questioned before treatment in the clinic.
- Detailed verbal and written information about the necessary hygiene measures at the beginning of patient admission, such as social distancing, wearing nose and mouth mask, and hand disinfection.
- Fever was measured.
- Wearing of a nose and mouth mask and maintaining a distance of > 1.5 m (4.62 ft) were obligatory.
- A maximum group size of 6 patients per treatment room, especially for the multimodal pain treatment groups, was mandatory.
- Improved ventilation of the treatment rooms.
- FFP 2 = Filtering Face Piece (N95) masks were reserved for immunocompromised patients.
- Accompanying persons were also interviewed and were only allowed to accompany the patient in special cases.

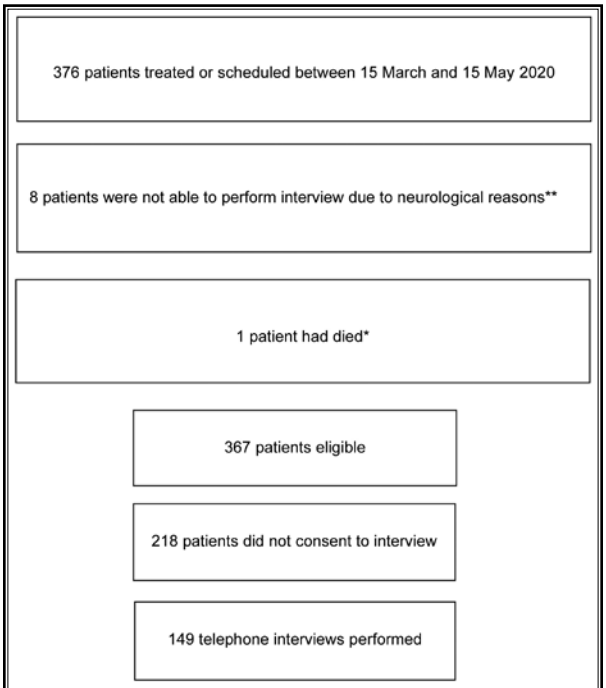


Fig. 1. *Flowsheet of patients eligible and patients analyzed.* *Due to COVID-19 infection; **Such as coma or aphasia.

## Results

### Patients

Three hundred and sixty-seven patients were eligible and 149 patients consented to the interview. One hundred and forty-nine interviews were performed and analyzed (40.2%) (Fig. 1). The mean age of these 149 patients (53 men/ 96 women) was 57.4 years (range 20.8 - 85.0 years, SD 14.61 years). During the study interval, there was not a single case of SARS-CoV-2 infection, either in the patients or in the staff at the institution.

| | |
|---|---|
| 1. | Have your medical or therapeutic appointments been postponed due to the COVID-19 pandemic? Yes ☐ No ☐ |
| 2. | In the event of a change of date, were you able to understand this decision and did you agree with the decision? Yes ☐ No ☐ |
| | |
| | The following questions included a scale from 1-10: |
| 3. | Did you experience a significant increase in pain during the pandemic? |
| | 0= not correct at all, 10= applies completely. If answering the question with 1-4, please switch to question 4 |
| 3.a. | The increase in pain was triggered by the deterioration in mood or the increase in anxiety and / or stress experienced during the pandemic |
| 3.b. | The worsening of the pain was caused by missing or postponing treatment during the pandemic |
| 3.c. | The increase in pain was triggered by the fact that the treatment through hygienic measures such as distance control and wearing a nose and mouth protection could not be carried out effectively enough. |
| 4. | During the COVID 19 pandemic, I felt a significant deterioration in mood or fear and / or stress |
| | 0= not correct at all, 10= applies completely. If answering the question with 1-4, please switch to the DASS questionnaire |
| 4.a. | This deterioration in mood or increased anxiety and / or stress was triggered by the pandemic |
| 4.b. | This deterioration was triggered by missing or postponing treatments during the pandemic |
| 4.c. | This deterioration was caused by the fact that the treatment through hygiene measures such as distance control and the wearing of nose and mouth protection could not be carried out effectively enough. |

Fig. 2. *Questionnaire used in the telephone interviews.*

## Pain and Psychological Distress During Pandemic

Fifty-seven (38.3%) patients reported a deterioration of pain, and 59 (39.6%) reported increased psychological distress during the pandemic (Table 1). An increase in pain and deterioration of depression/anxiety/stress were documented when patients had values > 4 on question 3 and question 4 of the questionnaire (Table 1).

## Postponed Treatments

Postponed treatments were reported by 84 patients. No delays were reported by 65 patients. Seventy-five patients (89.3%) agreed with the postponement of the treatment, while 9 patients did not.

Patients with delayed or cancelled treatments during the COVID-19 pandemic reported significantly more pain, depression, and stress, but not anxiety in their DASS values. Anxiety only showed a tendency towards statistical significance (Table 1). However, anxiety, stress, and depression, as well as hygiene measures, were not seen as more relevant by these patients than by those in whom treatment was not stopped or delayed (question 3). The perceived worsening of depression, anxiety, and stress (question 4) was attributed significantly more to the pandemic itself and to delayed treatments, but not to hygiene measures in patients with delayed and discontinued treatments than in patients without (Table 1). The pre-pandemic DASS values showed no statistically significant difference between the 2 groups (postponed vs. no postponed treatments), while the current DASS values did. Age and mean pre-pandemic pain values were not statistically different between the 2 groups (Table 1).

There was a strong correlation between the patients' answers to question 3 (increase in pain level) and question 4 (deterioration of depression/anxiety/stress) ($r(149) = 0.5281$, $P < 0.0001$).

## Gender Differences

There were no statistical gender differences in the study sample. Interestingly, within the group of patients with delayed or cancelled pain treatments, men showed higher depression, anxiety, and stress values and reported a higher impact of the pandemic on pain levels and psychological distress than women. These differences, although not statistically significant, showed a trend towards significance (Table 2).

## Interdisciplinary Multimodal Pain Therapy

Thirty-eight patients participated in a 3 to 5

Table 1. *Differences between patients with and without postponed treatment.*

| Variable | All patients | | | Patients with Postponed Treatment | | | Patients without Postponed Treatment | | | Mann-Whitney U-test* | *P* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Median (IQR) | M (SD) | n | Median (IQR) | M (SD) | n | Median (IQR) | M (SD) | n | | |
| pre DASS D | 9 (5, 13 ) | 9.52 (5.42) | 119 | 9 (5, 12) | 9.16 (5.44) | 75 | 9.5 (5, 14.75) | 10.14 (5.39) | 44 | 1478.500 | 0.344 |
| pre DASS A | 4 (2, 9) | 5.50 (4.66) | 119 | 4 (2, 9) | 5.77 (4.69) | 75 | 4 (2, 7) | 5.05 (4.62) | 44 | 1484.500 | 0.360 |
| pre DASS S | 9 (6, 14) | 10.10 (5.24) | 119 | 9 (5, 14) | 9.67 (5.33) | 75 | 9.5 (6, 15.5) | 10.84 (5.07) | 44 | 1419.000 | 0.202 |
| pre DASS total | 24.25 (15, 35.25) | 25.22 (13.10) | 118 | 24.25 (13.75, 33) | 24.74 (13.39) | 74 | 23 (16, 37.75) | 26.02 (12.72) | 44 | 1529.500 | 0.583 |
| pre mean pain | 7 (5, 8) | 6.53 (1.69) | 119 | 7 (6, 8) | 6.69 (1.46) | 80 | 6.5 (5, 8) | 6.30 (1.95) | 57 | 2043.500 | 0.294 |
| Age | 58.3 (50.6, 66.4) | 57.37 (13.97) | 149 | 56.00 (49.0, 65.0) | 55.69 (14.47) | 84 | 58 (50, 66.5) | 58.09 (13.34) | 65 | 2462.500 | 0.306 |
| Questionaire | | | | | | | | | | | |
| Question 3 | 2 (0, 7) | 3.43 (3.65) | 149 | 5 (0, 8) | 4.42 (3.73) | 84 | 0 (0, 4) | 2.15 (3.14) | 65 | 1801.000 | 0.000* |
| Question 3a | 6 (2,7) | 4.92 (3.85) | 58 | 6.5 (0, 8) | 4.95 (3.97) | 44 | 6 (4, 8) | 5.81 (3.13) | 13 | 1262.500 | 0.795 |
| Question 3b | 7 (7,9) | 5.47 (3.92) | 58 | 8 (4, 9) | 6.45 (3.53) | 44 | 2 (0, 7) | 3.15 (3.81) | 13 | 157.000 | 0.013* |
| Question 3c | 0 (0, 4.25) | 2.26 (3.25) | 58 | 0 (0, 5) | 2.52 (3.50) | 44 | 0 (0, 3.5) | 1.77 (2.20) | 13 | 271.000 | 0.755 |
| Question 4 | 3 (3, 6) | 3.54 (3.47) | 149 | 4.75 (0, 8) | 4.29 (3.74) | 84 | 2 (0, 5) | 2.56 (2.81) | 65 | 2061.500 | 0.009* |
| Question 4a | 7 (7, 8) | 6.21 (3.03) | 61 | 7 (5, 8.5) | 6.22 (3.30) | 45 | 5 (0.5, 6) | 4.45 (3.15) | 20 | 290.000 | 0.022* |
| Question 4b | 2 (2, 7) | 3.38 (3.63) | 61 | 5 (0, 8) | 4.53 (3.75) | 45 | 0 (0, 1) | 0.60 (1.39) | 20 | 199.000 | 0.000* |
| Question 4c | 0 (0, 3.5) | 2.16 (3.28) | 61 | 0 (0, 3.5) | 2.36 (3.59) | 45 | 0 (0, 1.75) | 1.30 (2.06) | 20 | 424.000 | 0.682 |
| DASS D | 4 (2, 11) | 6.44 (5.91) | 149 | 6 (2, 12.75) | 7.51 (6.27) | 84 | 3 (1, 8) | 5.00 (5.09) | 63 | 1998.000 | 0.011* |
| DASS A | 3 (0, 6) | 4.14 (4.66) | 149 | 3 (0, 8) | 4.94 (5.24) | 84 | 2 (0, 5) | 3.06 (3.51) | 63 | 2161.000 | 0.054 |
| DASS S | 6 (4,12) | 7.66 (5.52) | 149 | 7 (4, 12.75) | 8.47 (5.69) | 84 | 5 (1, 11) | 6.37 (5.07) | 63 | 2079.500 | 0.026* |
| DASS total | 15 (6, 29) | 18.14 (14.62) | 149 | 20 (7.25, 32) | 20.92 (15.55) | 84 | 11 (4, 24) | 14.43 (12.45) | 63 | 2016.500 | 0.014* |

$P \leq 0.05$ = statistically significant; IQR. interquartile range; M, mean; SD, standard deviation; n, sample size; p, probability; DASS, Depression Anxiety Stress Scale, *patients with postponed treatment vs patients without postponed treatment

week interdisciplinary multimodal pain therapy during the study period. A comparison of the study data between the 2 groups of patients with and without multimodal pain therapy showed no statistically significant differences. Patients undergoing interdisciplinary multimodal pain therapy considered themselves more limited by the strict hygiene measures, leading to increased psychological distress (Table 3).

## Discussion

The present study examines the impact of the COVID-19 pandemic on patients with chronic pain and psychological distress and the effects of pain therapy under pandemic-adapted conditions.

In our study, a significant number of patients reported worse pain or psychological distress during the pandemic. This phenomenon is not surprising and has been reported by different authors, as previous pandemics already showed negative effects on psychological distress of the normal population or mentally prestressed patients (12,27-31). Also, other life-threatening events, such as war or terrorism, have proven influence on pain and psychological distress (32-35). Shevlin et al (36) reported increased levels of anxiety with somatization and pain in times of pandemics. Furthermore, the well-known close connection between pain and psychological distress in patients with chronic pain (13,15,37-39) was confirmed by this study under pandemic conditions.

Patients with postponed appointments indicated significantly more pain and psychological distress although the majority of those patients who reported postponements agreed with the decision. Interestingly, patients with postponed treatments were significantly more depressed and stressed, but not significantly more anxious (Table 1). One explanation for this could be that anxiety might manifest itself in the course of the pandemic and its resulting socioeconomic consequences (40).

Table 2. *Gender differences.*

| Gender | | Male | | | Female | | | Mann-Whitney U-test | *P* |
|---|---|---|---|---|---|---|---|---|---|
| | | Median (IQR) | M (SD) | n | Median (IQR) | M (SD) | n | | |
| Total sample (n = 149) | Question 3 | 0 (0, 6) | 3.15 (3.74) | 53 | 3 (0, 7) | 3.58 (3.61) | 96 | 2325.000 | 0.364 |
| | Question 4 | 2 (0, 6) | 3.53 (3.66) | 53 | 3 (0, 6.75) | 3.54 (3.37) | 96 | 2483.000 | 0.804 |
| | DASS total | 13 (4.5, 31) | 17.96 (15.43) | 52 | 17 (7, 27.5) | 18.24 (14.24) | 95 | 2297.500 | 0.484 |
| Postponed treatments (n = 84) | Question 3 | 5 (0, 9) | 4.82 (3.96) | 22 | 4.5 (0, 8) | 4.27 (3.67) | 62 | 630.500 | 0.593 |
| | Question 4 | 5.5 (0, 9) | 5.23 (4.06) | 22 | 4 (0, 7) | 3.96 (3.60) | 62 | 560.500 | 0.208 |
| | DASS total | 25.5 (8.75, 37.75) | 24.91 (16.08) | 22 | 16.5 (6.75, 29.25) | 19.51 (15.24) | 62 | 537.000 | 0.140 |

* $P \leq 0.05$; IQR, interquartile range; M, mean; SD, standard deviation; n, sample size; p, probability; DASS, Depression Anxiety Stress Scale

Table 3. *Differences between patients with and without multimodal pain therapy prior to interview.*

| Variable | | Treatment**: yes | | | Treatment**: no | | | Mann-Whitney U-test | *P* |
|---|---|---|---|---|---|---|---|---|---|
| | | Median (IQR) | M (SD) | n | Median (IQR) | M (SD) | n | | |
| Total sample (n = 149) | Question 3 | 2 (0, 6) | 3.24 (3.47) | 38 | 3 (0, 7) | 3.50 (3.73) | 111 | 2076.000 | .882 |
| | Question 3a | 8 (5.5, 8.5) | 6.50 (3.19) | 13 | 5.5 (0, 8) | 4.75 (3.88) | 44 | 222.000 | .217 |
| | Question 3b | 7 (1, 9) | 5.38 (3.80) | 13 | 7 (1.25, 9) | 5.80 (3.87) | 44 | 261.500 | .637 |
| | Question 3c | 5 (0, 7) | 4.08 (3.82) | 13 | 0 (0, 3) | 1.84 (2.92) | 44 | 192.000 | .051 |
| | Question 4 | 3.5 (1.75, 6.25) | 4.09 (3.33) | 38 | 3 (0, 6) | 3.35 (3.51) | 111 | 1788.500 | .153 |
| | Question 4a | 5.5 (1.25, 7.75) | 4.90 (3.39) | 20 | 7 (5, 8) | 6.02 (3.29) | 45 | 361.000 | .201 |
| | Question 4b | 1 (0, 6) | 3.00 (3.66) | 20 | 2 (0, 7) | 3.47 (3.73) | 45 | 422.000 | .678 |
| | **Question 4c** | **1 (0, 6.5)** | **3.15 (3.65)** | **20** | **0 (0, 2)** | **1.53 (2.92)** | **45** | **305.500** | **.023*** |
| | DASS total | 17 (6, 26.75) | 18.39 (15.12) | 38 | 15 (6, 29.5) | 18.05 (14.51) | 109 | 2065.500 | .981 |

* $P \leq 0.05$, **multimodal pain therapy after beginning of the pandemic and before interview; IQR, interquartile range; M, mean; SD, standard deviation; n, sample size; p, probability; DASS, Depression Anxiety Stress Scale.

Our study shows that pain and psychological distress were not attributed to the pandemic associated increased hygiene measures. The positive effects of pain therapy may appear to be more important for the patient than potential inconveniences of hygiene measures. Yet, under strict hygiene measures, concerns about the pandemic and the risk of possible infection during pain therapy may recede into the background.

The DASS values were significantly worse prior to the onset of the pandemic than those under the pandemic. This might be due to the fact that these values were obtained on initial assessment at the IPC when specialized pain treatment had not yet been initiated. Follow-up DASS values collected during the pandemic must also be regarded with caution, as they were collected in telephone interviews. The patients might tend to give more positive ratings or respond more realistically to the questions (41-44). The elevated DASS values prior to the survey could also be attributed to the fact that the study was performed at a large universitary IPC, which predominantly treats patients severely affected by chronic pain and a high proportion of psychological comorbidities. Another reason for the lower follow-up DASS values could be that even the expectation of treatment could itself act as a stabilizing factor. A longitudinal study by Wang et al (45) found statistically significant changes regarding anxiety, depression, and stress in a large cohort. The study identified protective factors such as confidence in doctors and satisfaction with health information as a factor for stabilization of psychological distress in times of pandemic (45).

Perhaps psychological treatment as an essential part of interdisciplinary multimodal pain therapy may proportionally stabilize or improve patients with psychological distress (46,47). The existential threat of the pandemic may alter the patient's perception of chronic pain. Does the risk of a potentially fatal infection put one's own level of suffering into perspective?

Kersebaum et al (48) showed an early influence of COVID-19 pandemic associated restrictions with pain

increase in only 11.6% of patients with painful polyneuropathy. Using the rumination score of the Pain Catastrophizing Scale, they suggested that a shift of attention from the chronic pain towards mental preoccupation with the threat might be the reason for the relatively small number of patients with pain increase. We also believe that a distraction from pain by fewer thoughts about the pain and higher mental attention to the pandemic could be a possible explanation for this result (48). Petzold et al (12) showed extensive occupation with COVID-19 related topics of 258 minutes per day, even in the normal population. A postponement of treatments could also have led to increased brooding in our examined patients and thus to worsening pain and psychological distress.

Although not statistically significant, men with delayed or cancelled pain treatments showed higher depression, anxiety, and stress values and reported a higher impact of the pandemic on pain levels and psychological distress than women in our study. In contrast to this result, a summary of 19 studies about protective and risk factors for psychological distress of health workers during the pandemic identified "female gender" as one of the risk factors for deterioration (27,49). Petzold et al (12) found higher scores of COVID-19 anxiety in women, but they did not draw any definitive conclusions because of the fact that women generally show higher levels of anxiety and depression (12). However, this observation could be explained by social disconnection and loneliness under pandemic conditions and the fact that women carry a greater social burden during COVID-19 (7,50). These gender differences with higher psychological distress for women could not be shown consistently in all studies on this topic (51-53).

Only a subgroup of inpatients undergoing interdisciplinary multimodal pain therapy considered themselves more restricted by the strict hygiene measures. In our opinion, this effect can be explained well by the higher frequency with which the hygiene measures are applied in contrast to outpatients.

For an appropriate decision on the extent of pain treatment under pandemic conditions, 2 aspects have to be weighed against each other: on one hand, the likelihood of an infection acquired in hospital, and on the other hand, the suffering of the patient as a result of the cancelled or postponed treatment. The likelihood of infection in a hospital environment was estimated as relatively low even at the point of culmination in Germany in March and April of 2020. Conversely, the experience from Bergamo shows that hospitals in particular can also play a major role in the spread of the disease (54). A dramatic decrease of the nosocomial COVID-19 infection rate after introduction of a strict hygiene bundle was reported by Ambrosch et al (55). In order to make an appropriate decision, not only the risk of a hospital-acquired infection must be assessed, but also the degree of pain aggravation or psychological distress due to lack of treatment. The present study was intended to provide additional information for better decision-making.

In our IPC, a sophisticated hygiene concept was developed at an early stage of the pandemic, which made it possible to continue pain treatment. These hygiene measures have proven to be practicable and, as the study shows, were accepted by the patients. Only a small subgroup of inpatients who received multimodal pain therapy tended to find the hygiene measures more stress-increasing than those patients without multimodal treatment. Since the interdisciplinary multimodal pain therapy is carried out daily for 3 to 5 weeks, the patients are also exposed to hygiene measures much more frequently than at home or on an outpatient basis. Yet, we also experienced that the reduction in group size during interdisciplinary multimodal pain therapy was appreciated. Many patients felt a more personal and intense treatment in the smaller groups.

## Limitations

The limitations of the study are the small number of patients as a result of the limitation to a short period of time at the beginning of the pandemic. We attribute the return rate of 40.2% of the study consents in part to the strict data protection requirements. Due to an exploratory approach in the study evaluation and the small number of patients in this limited time slot, we waved a Bonferroni correction. There are no data concerning further influencing stress factors like job status, social injustice, financial problems, social distancing and lack of care due to the pandemic, and their impact on the well-being of the patients (50). The functional status was not assessed, as the patients were only studied by means of a telephone interview and an assessment of the functional status would therefore have meant a self assessment of the patients.

The strength of the study is that it focused precisely on the period of the lockdown and therefore included those patients maximally affected by treatment postponements. The patients were included in

a region with high COVID-19 numbers compared to other regions in Germany. The pre-study data of the included patients showed a relatively high level of psychological distress.

## Conclusions

In summary, it can be stated that many pain patients suffer severely from the COVID-19 pandemic, in terms of both chronic pain and psychological distress. This increase in chronic pain and psychological distress is least caused by the tightened hygiene measures. Chronic pain patients seem to benefit from continuing pain therapy even in times of pandemic. Our study shows that continuation of pain therapy despite enforced hygiene measures is feasible and can be recommended to stabilize or improve pain and the psychological condition even during a pandemic.

These results should be taken into account, especially in light of the fact that chronic pain patients are often neglected in health care. This holds true not only during the COVID-19 pandemic, but also in the post-pandemic future (56).

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