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Health Services Research

Cross-Sectional Study Evaluating Clinical & Psychological Impact of Limited Access to Healthcare in Chronic Pain Patients During the COVID-19 Pandemic

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Background: COVID-19 quarantine measures have created new challenges in the delivery of medical care, especially in the realm of medical and interventional chronic pain management. This study evaluated the effect of COVID-19 social distancing and quarantine measures on symptoms of pain and anxiety, as well as substance abuse and health care engagement in patients with chronic pain and the role of the clinic's virtual assessment initiatives in managing these patients.

Methods: A 24-question cross-sectional survey was conducted with patients with chronic pain seen at the Montefiore Medical Center Comprehensive Pain Clinic from June 2020 through July 2020. The survey was administered to 552 high-utilizer patients via telephone, evaluating domains such as pain, anxiety, substance use, and health care engagement. The questions were quantitively assessed on a Likert scale or a numerical rating scale. We used descriptive statistics to report our results.

Results: Of the 1,023 patients identified as high utilizers of the pain clinic, 552 patients participated in the survey. The median (25th-75th percentile) pain score reported was 7 (5-9) for all responders. Approximately 50% of the patients reported that they were anxious about their pain and somewhat or very concerned that their pain would be uncontrolled during the pandemic. Further, the severity of the pain reported was associated with sleep, appetite, and mood changes.

In our cohort, 95% of all patients denied using alcohol, 92% denied using marijuana, and 98% denied using other recreational drugs to manage their pain during the pandemic. In addition, just more than three-fourths (79%) of all patients reported needing to speak with their health care provider during the pandemic.

Conclusions: The survey conducted among high-utilizers demonstrated that patients who remained engaged with their health care team reported minimal concerns regarding chronic pain and associated symptoms during the COVID-19 quarantine period. In addition, the early implementation of virtual consults in the pain clinic may have contributed to mitigating patient concerns. Finally, the study also identified the importance of outreach and patient education on the availability and utilization of telemedicine services. Consequently, it is reasonable to implement virtual assessments and visits alongside other education outreach methods to engage patients with chronic pain who frequently utilize chronic pain health care resources.

Key words: Chronic pain, pandemic, COVID, quarantine, substance abuse, anxiety, telemedicine, patient satisfaction, survey, health care engagement

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Throughout history, natural disasters, plagues, and pestilences have challenged the delivery of medical care by health care systems across the globe (1-5). In 2003, the Severe Acute Respiratory Syndrome (SARS) pandemic resulted in significant disruption of health care delivery in the eastern hemisphere. This disruption also created psychosocial trauma among the affected population (1-4,6-8). Likewise, the MERS-CoV pandemic in 2012 and the Ebola epidemic in 2016 caused similar strains on health care resources and access to care. Presently, the novel coronavirus (SARS-CoV-2 or COVID-19) pandemic has developed into an unprecedented global emergency, surpassing most prediction models, and continues to devastate the people and the health care systems of the world (9).

During the peak of the pandemic in early 2020, multiple countries enacted national social distancing policies, travel restrictions, and quarantine measures to curtail the spread of COVID-19, with the hopes of reducing the spread and hospitalization rates. This led to a paradigm shift in the delivery of medical care in the United States and worldwide, leading to massive infrastructure changes and a surge in the implementation of remote telemedicine services (10-15). The hurried and improvised implementation of these services has been met with confusion and reluctance by patients (16,17). A recent study found that expeditious telemedicine service implementation resulted in decreased satisfaction scores compared to in-person visits, thereby increasing the risk of reduced utilization (18).

During the initial surge of the COVID-19 pandemic in early 2020, emergency departments noted rapid decreases in daily patient visits, likely as a prophylactic measure to avoid contact with possible carriers (19). A similar reduction in office-based primary care visits has complicated first-line access to patients' medical needs, leading to potential complications associated with their medical conditions, as well as their overall well-being (20-23). With limited prior experience in managing a prolonged pandemic of this magnitude, physicians have faced unique challenges requiring adaptation strategies to position their clinical practices accordingly, especially those managing patients with chronic conditions requiring frequent evaluation such as patients with chronic pain (24,25). Thus, physicians face several challenges in maintaining care continuity with patients with chronic pain (26-30). In addition, prior studies have noted detrimental effects of social isolation resulting from quarantine policies on a patient's psychological well-being and perceived pain symptoms (18,31). Consequently, it is essential to avoid deterioration of pain symptoms and coexisting comorbidities such as opioid dependency, anxiety, and depression in these patients (26-28,32).

This study aimed to evaluate the effect of COVID-19 quarantine measures and social distancing policies on the symptoms of patients with chronic pain, psychosocial comorbidities, behavior habits, and health care engagement and to evaluate the effect of virtual consults initiated by the pain clinic in managing these patients.

Methods

Design and Patients

We conducted a cross-sectional survey in June and July 2020 with patients with chronic seen at the Montefiore Medical Center Comprehensive Pain Center. The survey was conducted among eligible patients who visited the pain clinic from January 2019 through March 2020. We used our hospital's proprietary querying software, Clinical Looking Glass, to identify the patients.

From the identified patients, we selected patients who were designated as "high utilizers," whom we defined as patients who presented to the pain clinic for their medical care more than 3 times within 6 months in the year preceding the COVID-19 surge. We selected this definition for high utilizers based on our pain clinic visit data and advice from experts regarding the complexity of managing pain in patients who frequently visit the clinic, and the assumption that patients who frequently visit the clinic are most vulnerable to COVID-19 quarantine measures. In this study, we only included English or Spanish speakers for ease of verbal administration of the survey over the telephone. Finally, we excluded patients with a positive COVID-19 diagnosis as the diagnosis of COVID-19 could exacerbate and confound the variables being studied. Patients not reachable via telecommunications and those under 18 years old were also excluded. The research study was approved by Montefiore Medical Center's Institutional Review Board (IRB).

Questionnaire Development

We developed a pool of possible questions pertaining to 4 predetermined domains based on literature review and discussions conducted with the study team. The 4 domains included the patient's pain, anxiety, substance use history, and health care activity engagement.

During the development phase, 28 multiple-response questions and one open-ended question related to these 4 domains were drafted. For validation purposes, an internal focus group of researchers associated with the study evaluated the questions for structure and clarity. All the questions were scrutinized and modified until unanimous agreement was reached among the members. During the questionnaire development phase, 4 questions were eliminated. The final survey contained 24 questions and one open-ended question. For reference, the survey is included in the supplemental digital section, Appendix 1, Survey.

Responses to survey questions were measured using different scales; for example, the current pain score was evaluated using a numerical rating scale of 0-10, 0 indicating no pain, and 10 indicating the worst pain imaginable. A Likert scale ranging from "not controlled at all, slightly controlled, somewhat controlled, mostly controlled, and completely controlled" was used to measure questions where a Likert scale was deemed more appropriate than a numerical scale. The majority of the substance use and engagement activity questions were measured using a dichotomous response; "yes or no," and "not applicable" was also listed as an option in a few cases. The open-ended question inquired about using any other pain management modalities that were not addressed in the survey.

Consent and Survey Administration

The research team contacted the study patients via telephone to administer the survey. After confirming the prescreened patients' identities, the study investigators obtained oral consent using a script that was approved by Montefiore Medical Center's IRB. The purpose of the study was explained to the participants during the consenting process. On average, each survey took approximately 10 minutes per patient. For Spanish speakers, an IRB-approved Spanish translation of the survey was administered by a fluent Spanish-speaking researcher. The survey was conducted from June 2020 through July 2020. Contact with all patients was attempted twice before they were designated as nonresponders and excluded from the study. The responses were identified by patient identification number only.

Statistical Analysis

No required sample size was calculated for the study, as we planned to contact all eligible patients who met the study inclusion criteria. We used descriptive statistics to report the data. Continuous variables are reported as mean ± standard deviation or median (25th-75th percentile) and categorical responses as percentages. For subgroup analysis, we grouped patients into 2 groups: patients with and without severe pain. Patients with a pain score of 7 and above on an 11-point scale were included in the severe pain group; patients with a pain score of 0-6 were grouped into the nonsevere pain group.

Similarly, we grouped patients as anxious versus less anxious. Patients who reported "somewhat anxious" and "very anxious" were grouped into the anxious group, and patients who reported "not being anxious" and "slightly anxious" were grouped into the less anxious group. Finally, we evaluated the association between pain severity and other variables such as current medication use, anxiety levels, and substance abuse. To explore the association between the variables mentioned in the subgroup analysis, we used Pearson χ^2 analysis. All *P* values reported are unadjusted, and a *P* value of < 0.05 was considered statistically significant. IBM SPSS software, version 24 (IBM Corp.) was used for the analyses.

Results

Of the 5,278 unique patients who visited the Montefiore Multidisciplinary Pain Center, 19% (1,023/5,278) patients were identified as high utilizers. Among the high utilizers, 53% (552/1023) participated in the survey. Detailed information regarding the number of patients included in the final analysis is depicted in the flow chart in Fig. 1. Baseline demographics, such as age, gender, and race, are depicted in Table 1. The mean age of responders was 61 ± 14 years, with 76.3% (421) women and 23.7% (131) men.

Pain Characteristics and Severity

The median (25th-75th percentile) pain score reported was 7 (5-9) for all responders. The distribution of the pain scores reported by the patients is depicted in Fig. 2. There was no significant difference in the reported pain score between men and women. When asked about " how well controlled their pain was," 28% (155/552) of the patients reported their pain was "not controlled at all," and 29.3% (162/552) reported their pain was only "somewhat controlled," while only 6.4% (35/552) reported their pain is "completely controlled."

Most of the patients reported some impairment in daily function due to pain. Among the patients who reported impairment, 17% (94/552) reported pain

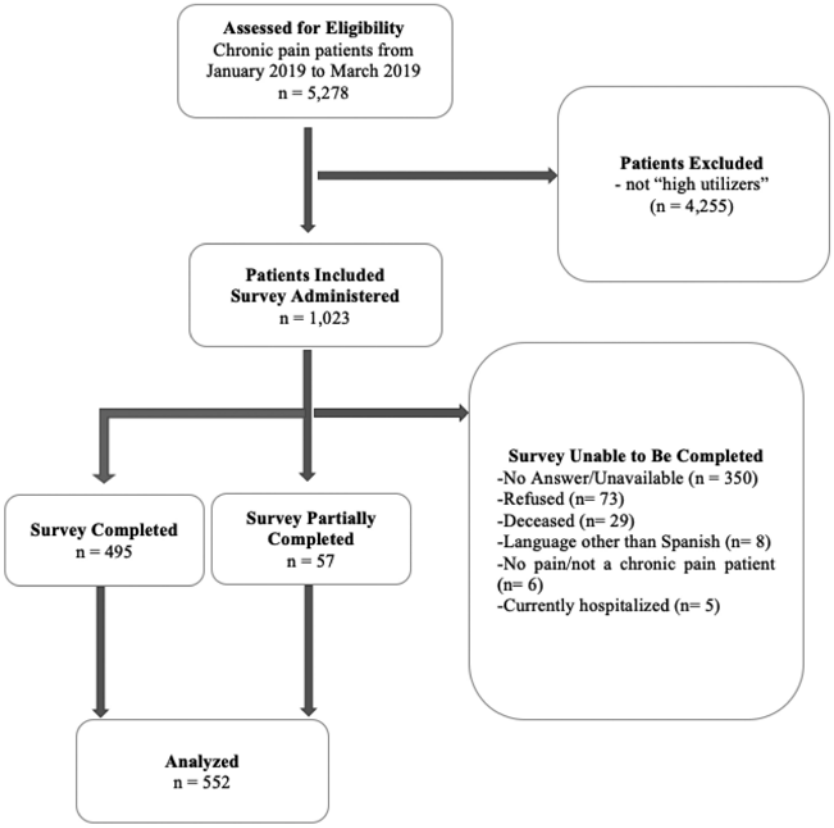

Fig. 1. *Flowchart representing responders included in the final analysis*

Table 1. *Baseline demographics of survey responders (n = 552)*.

Age ± SD (yrs)	61 ± 14
Distribution of survey responders age	
0-45 yrs	12.7%
46-55 yrs	19.4%
56-65 yrs	31.3%
65-100 yrs	36.5%
Gender (women)	76%
Race	
Black/African American	31.7%
Hispanic	40.7%
White	9.6%
Asian	1.6%
American Indian/Alaska Native	0.36%
Patient Declined/Unavailable	16.4%

Values are mean ± SD and percentages

impairs all function/ activities, and 26.8% (148/552) reported that pain impairs most function and activities. Only 11% (60/552) reported no impairment of any activities. The percentage of patients reporting functional impairment among the patients with different pain control levels is depicted in Fig. 3. Approximately 50% of the patients reported not being concerned or only slightly concerned that their pain would be out of control due to the pandemic. Additionally, among the patients concerned about their pain during the pandemic, 39% (136/348) were from the severe pain group, and only 15% (31/198) were in the nonsevere pain group, *P* value < 0.001.

Pain and Anxiety

Approximately 50% (275/552) of responders reported being either somewhat or very anxious about their pain. Additionally, about 47% (263/552) of patients reported being somewhat or very anxious about the pandemic. Furthermore, 55.1% (305/552) of the patients reported a change in sleep habits, 26.5% (146/552) reported a change in appetite, and 42.9% (237/552) reported a mood change. Among the patients who reported changes in sleep habits, 63% (217/347) were in the severe pain group and 43% (86/198) in the nonsevere pain group, *P* value 0.001. Similarly, the percentage of patients who reported changes in appetite was 33% (116/347) versus 15.2% (30/198) in the severe and nonsevere pain groups, respectively, *P* value 0.001. Finally, among the patients who reported mood changes, 51% (176/347) were in the severe pain group and 30.3% (60/198) in the nonsevere pain group *P* value 0.001. Detailed survey responses regarding the changes in sleep, appetite, and mood among patients with varying pain severity are depicted in Fig. 4. Lastly, most patients who reported being very anxious about their pain also reported changes in sleep, appetite, and mood as seen in Fig. 5.

Pain and Substance Use/Abuse

About 75% (413/552) of all patients reported having

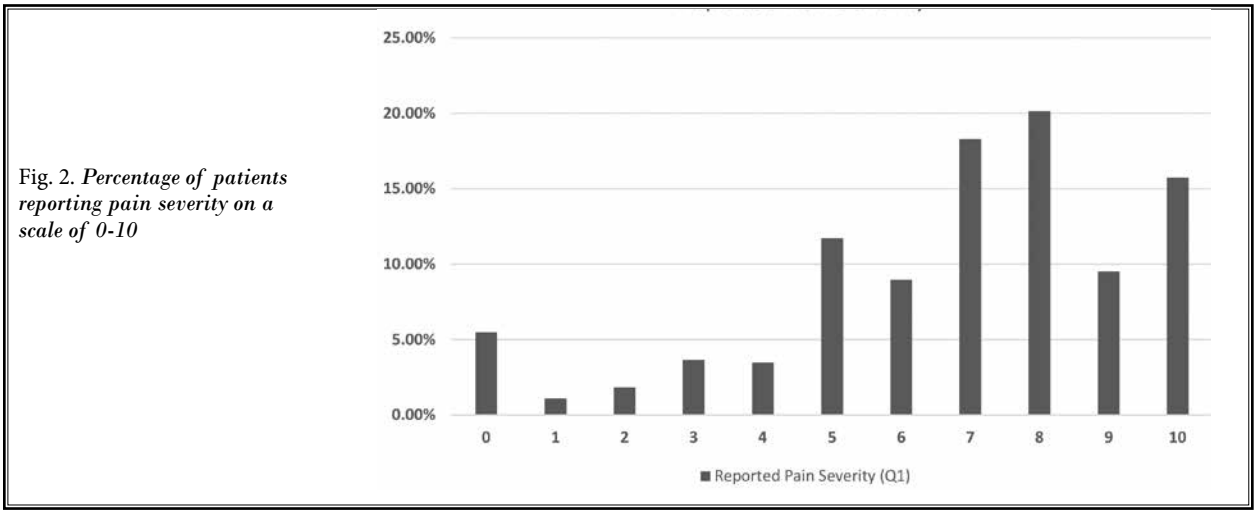

Fig. 2. *Percentage of patients reporting pain severity on a scale of 0-10*

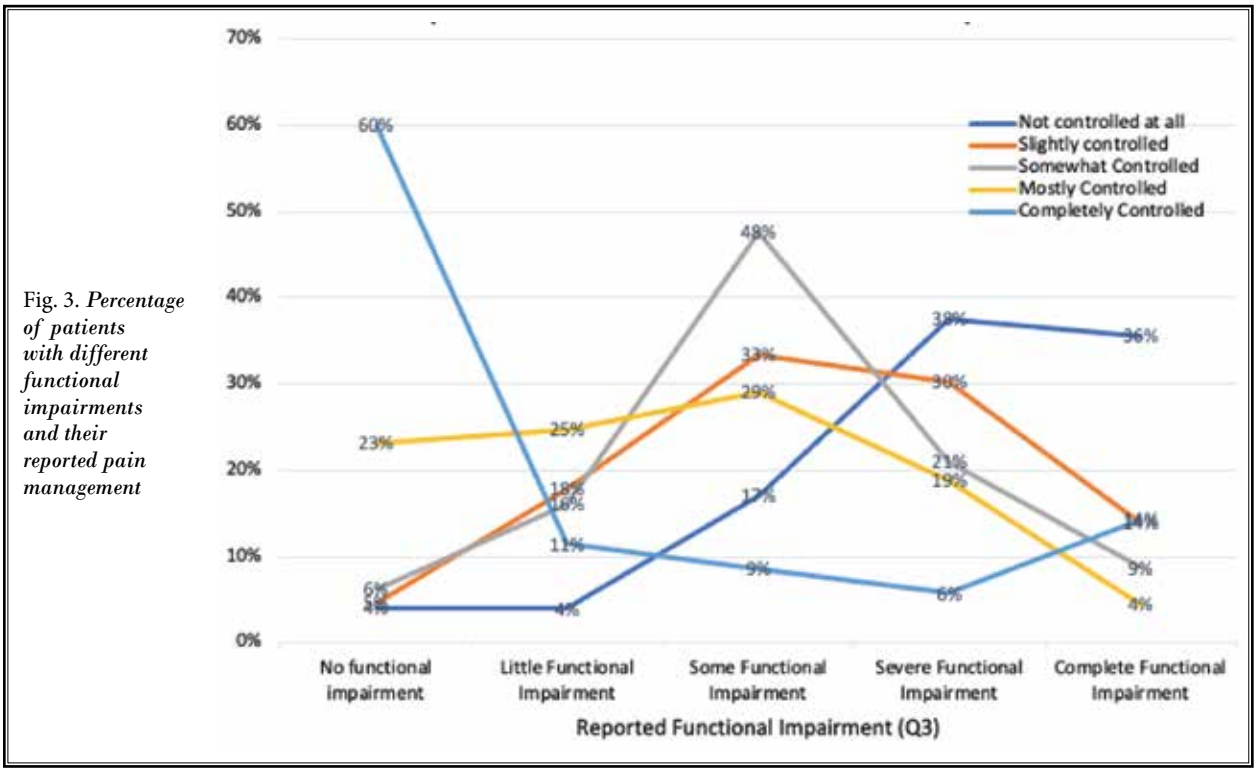

Fig. 3. *Percentage of patients with different functional impairments and their reported pain management*

enough medication to treat their pain during the pandemic. Similarly, 79% (432/552) of all patients reported having enough medication for their pain until their next physician appointment. Most patients denied adjusting their daily prescribed dose of medication: 76.2% (42/552) of all patients denied taking more than their daily dose to sufficiently manage their pain, and 82.9% (457/552) of all patients denied taking less than their daily dose to conserve their medication. In addition, 83.3% (460/552) of all patients denied experiencing the urge to use more drugs than what was prescribed during this pandemic. In terms of substance use, 95.1% (525/552) of all patients denied using alcohol to manage pain, 92.2% (506/552) denied the use of marijuana, and 98% (541/552) denied using other recreational drugs to manage their pain during the pandemic.

Among the patients who reported severe pain, the percentage of patients who reported not hav-

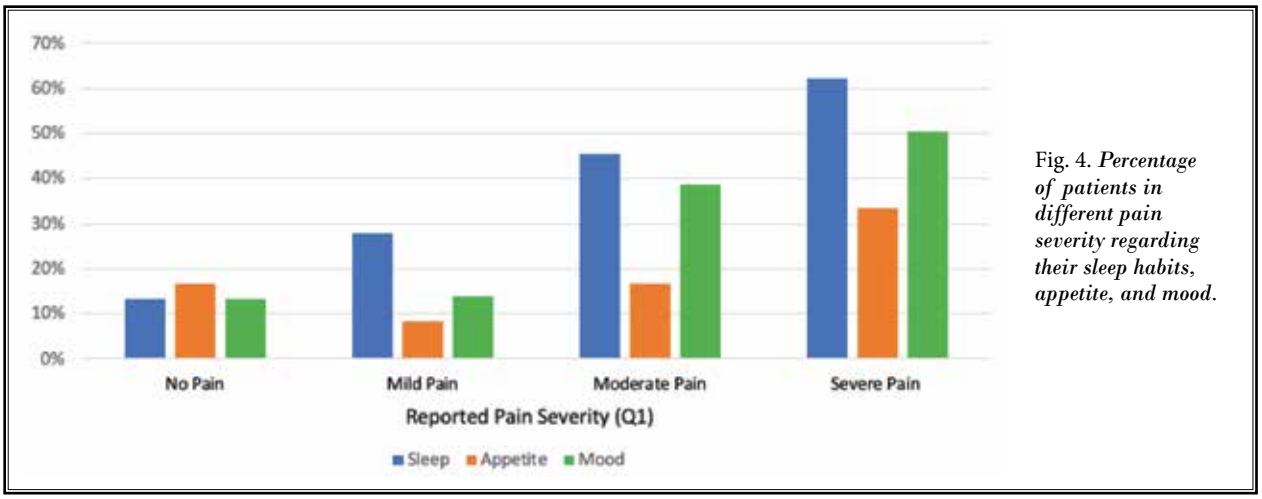

Fig. 4. *Percentage of patients in different pain severity regarding their sleep habits, appetite, and mood.*

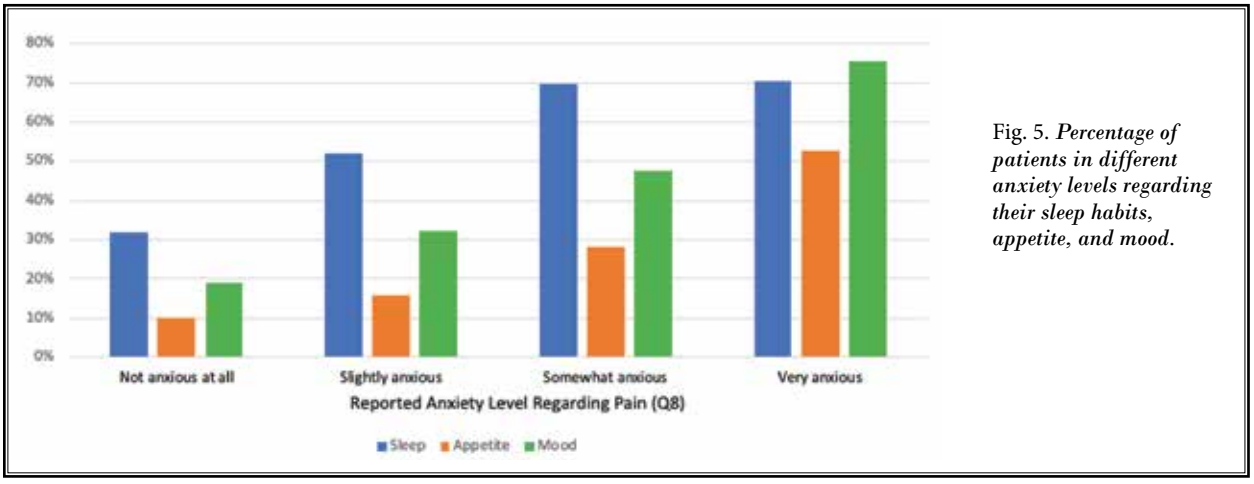

Fig. 5. *Percentage of patients in different anxiety levels regarding their sleep habits, appetite, and mood.*

ing enough medication until the next doctor's visit was 25% (87/347) compared to 13.2% (26/197) in the nonsevere group, *P* value 0.001. Similarly, for patients who reported anxiety about pain and/or the pandemic, the percentage of patients who reported not having enough medication was 27.8% (62/263) compared to 16.3% (40/246) in the nonanxious group, *P* value 0.001.

We did not find any association between recreational drug use and anxiety; the percentage of patients who used recreational drugs to ease their pain was 1.3% (3/223) in the anxious group and 2.8% (7/248) in the nonanxious group, *P* value 0.267. Likewise, the percentage of patients using recreational drugs in the severe pain group was 1.7% (6/348) compared to 2.5% (5/198) in the nonsevere pain group, *P* value 0.522. The survey responses regarding medication use in patients with different pain levels are depicted in Fig. 6. Similarly, the survey responses regarding medication use and the need to speak to a health care provider among patients with different anxiety levels are depicted in Fig. 7.

Pain and Health Care Engagement

In this study, 78.8% (431/552) of all patients reported needing to speak with their health care provider during the pandemic. Similarly, 78.8% (434/552) of all patients were engaged with their health care providers during the pandemic. Also, 87.8% (484/552) of all patients were aware that their health care provider was available via telemedicine, and 62.3% (344/552) of all patients had consultations regarding their pain during this pandemic. Before the pandemic, 42.9% (237/552) of all patients were engaged in prescribed physical therapy. However, only 18.1 (43/237) % of all patients could continue with this physical therapy during the pandemic.

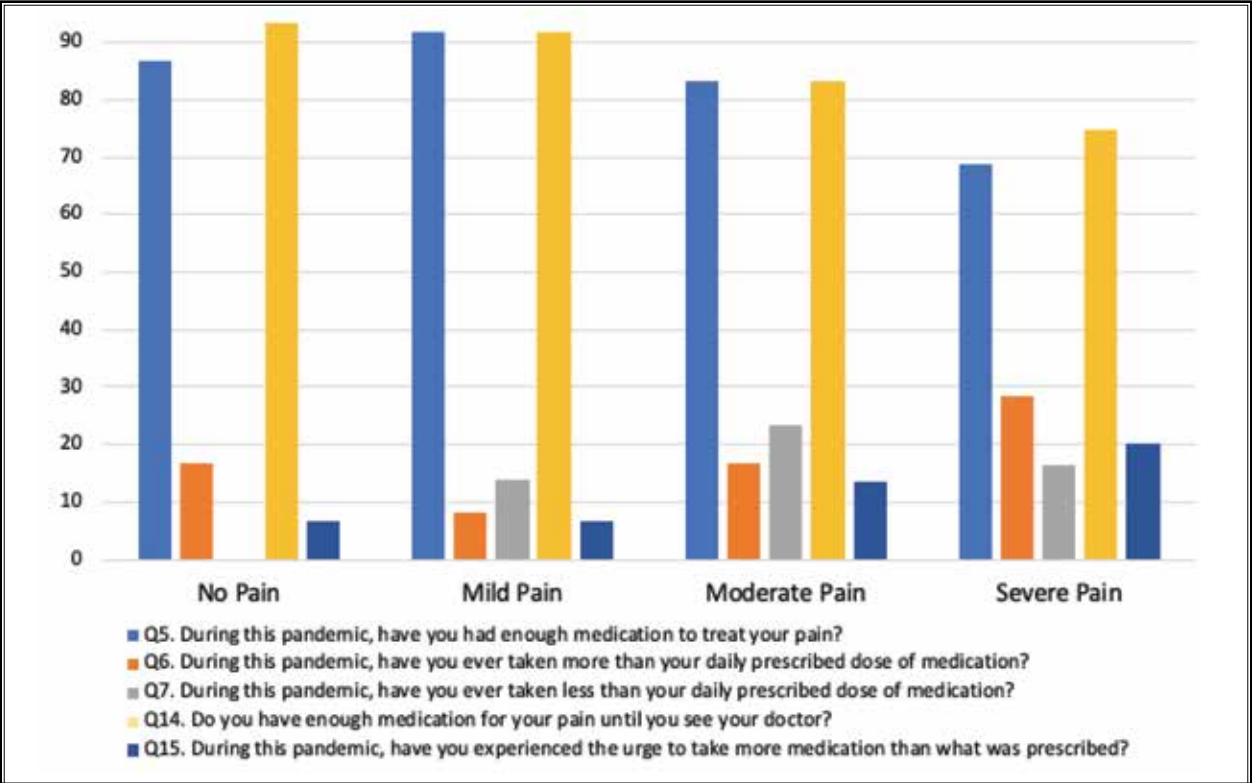

Fig. 6. *Percentage of patients and survey response regarding medication use, the severity of pain, and medication use*

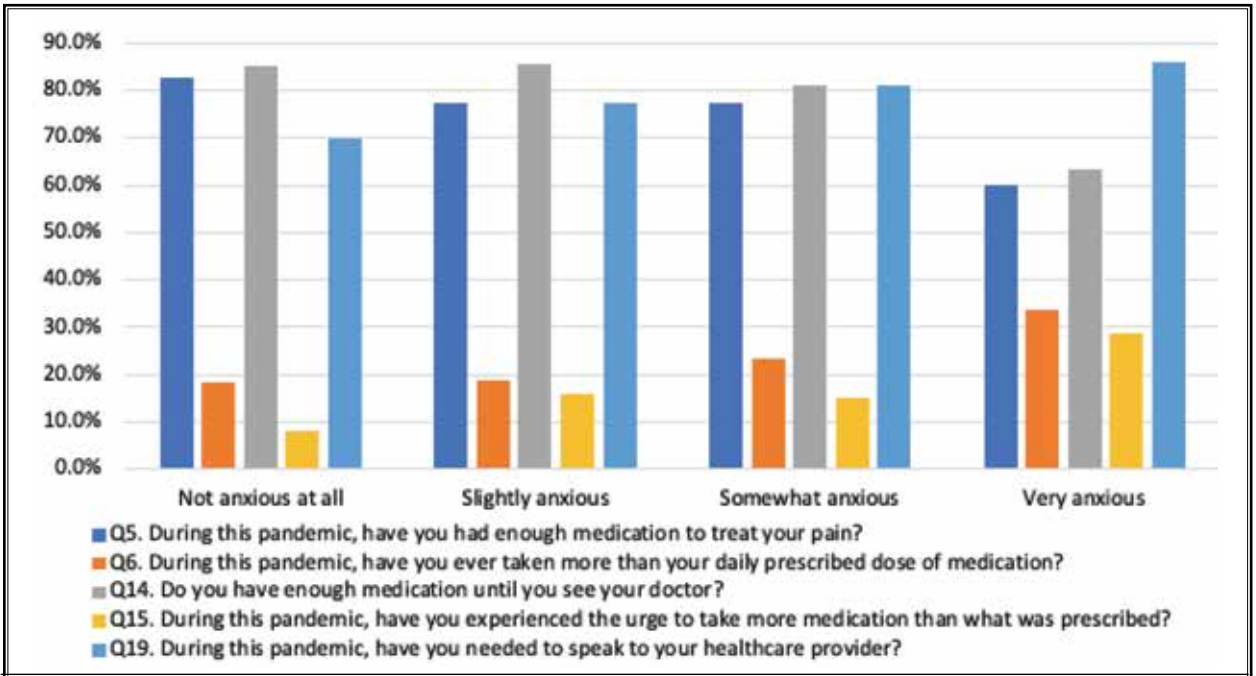

Fig. 7. *Percentage of patients and survery responses to questions regarding anxiety*

In the subgroup analysis, we found that the percentage of patients with health care engagement compared to patients without health care engagement (83% vs 66% [342/412], [90/137] *P* value 0.001, reported having enough medication to treat their pain during the pandemic. We also identified that 6.8% (29/429) of patients who reported a need for talking to their health care provider were not aware of the availability of telemedicine. Additionally, the proportion of patients without the knowledge of the availability of telemedicine differed based on their health care engagement, 4.6 % and 39.3 %, (20/432) and (46/117) respectively, *P* value, 0.001. The survey responses to the questions regarding medication use and the need to speak to a health care provider as well as awareness of telemedicine among the patients with and without health care engagement are depicted in Fig. 8.

The percentage of patients who responded to each survey question are depicted in Tables 2 and 3.

Discussion

The results of our cross-sectional study indicate that in patients who are high utilizers of pain resources, who remain engaged with their health care team, had minimal concerns regarding worsening chronic pain and associated symptoms during the COVID-19 quarantine period. Our results also indicate that implementing virtual consults and proactive policies and procedures may have contributed to mitigating these concerns. Predictably, these measures adversely affected patients not engaged via telemedicine services and patients with existing comorbid risk factors. While the results indicate that these social distancing policies and lack of physical access to health care services minimally affected the actively engaged patients with chronic pain, the survey also identified essential patient opinions that could help implement patient-centered strategies for improved patient care. For example, some patients were not aware that the clinic implemented telemedicine services; for those aware of telemedicine services, some patients reported a lack of familiarity with mobile applications to engage in a remote visit. We believe telemedicine implementation is vital to maintaining continuity with patients with chronic pain in the event of a prolonged COVID pandemic.

Our study results highlight the importance of continuity of care and access to health care services for patients with chronic pain. Unfortunately, the same data also showed that nearly one-third of patients who were not actively engaged with their physicians were unaware that telemedicine services were available. Among those unengaged patients, approximately one-third reported a need to speak to their physician regarding their health during the quarantine period. Consequently, raising awareness regarding telemedicine services is a key factor for the continued delivery of quality medical care during the pandemic and increasing the percentage of patients

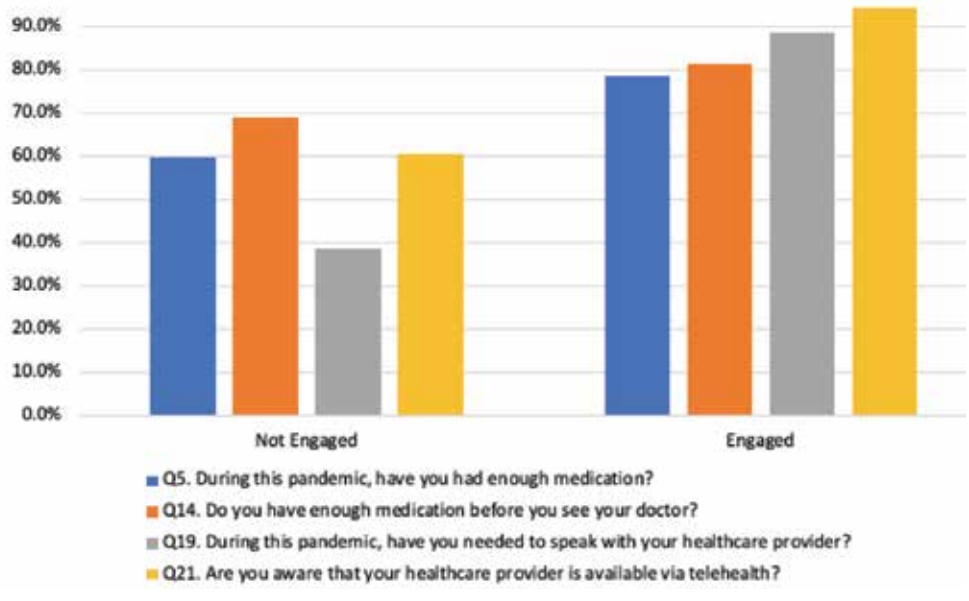

Fig. 8. *Survey responses of pati4ents who were engaged and not engaged with physicians during the pandemic regarding their medication use, amount of medication, their need to speak with a healthcare provider, and their awareness of telehealth.*

Table 2. *Responses to survey questions 1-13.*

Question	Response	Percent
Q1. How would you rate your current pain?	No pain	23
	Mild	5.3
	Moderate	20.7
	Severe	50.2
Q2. How well-controlled is your current pain?	Not controlled at all	27.7
	Slightly	23.4
	Somewhat	29.3
	Mostly	12.5
	Completely	6.3
Q3. How much does your pain currently impair your daily function/daily activities?	No function/activities	10.9
	Little to no	14.4
	Some	30.7
	Most	26.9
	All function/activities	17.1
Q4. During this pandemic, how concerned are you that your pain will be out of control?	Not concerned at all	22.3
	Slightly	22.8
	Somewhat	24.5
	Very Concerned	30.3
Q5. During this pandemic, have you had enough medication to treat your pain?	No	24.9
	Yes	74.9
Q6. During this pandemic, have you ever taken more than your daily prescribed dose of medication to sufficiently manage your pain?	No	76.2
	Yes	23.6
Q7. During this pandemic, have you ever taken less than your daily prescribed dose of medication to conserve your medication?	No	82.9
	Yes	17.1
Q8. Currently, how anxious do you feel regarding your pain?	Not anxious at all	30.7
	Slightly	19.3
	Somewhat	24
	Very anxious	25.8
Q9. How anxious do you feel regarding the current pandemic?	Not anxious at all	30.7
	Slightly	22.4
	Somewhat	23.9
	Very anxious	23
Q10. How concerned are you that you would not be able to see a doctor when you needed to during the pandemic?	Not concerned at all	28.2
	Slightly	26.2
	Somewhat	18.2
	Very concerned	27.5
Q11. During this pandemic, has your pain caused you to experience changes in your:		
a. sleep habits	No	44.5
	Yes	55.1
b. appetite	No	73.5
	Yes	26.5
c. mood	No	55.9
	Yes	42.9
Q12. During this pandemic, have you felt isolated?	No	66.5
	Yes	33.5
Q13. Have you felt anxious about not being able to return to school or work because of pain during the pandemic?	No	22.2
	Yes	10.4
	Not applicable	67.4

utilizing these services. The findings of this study are consistent with other studies in the current literature regarding the benefits of using telemedicine for uninterrupted care during similar situations of social isolation (33,34).

With the fortunate development of multiple messenger RNA vaccinations approved under the US Food and Drug Administration's emergency use application, the incidence of COVID-19 cases and hospitalization rates began initially to plateau. However, due to the emergence of variant strains and a public reluctance to get vaccinated, hospitalization rates have once again started to increase, with multiple states reporting maximal intensive care unit capacity for patients with COVID. Furthermore, the percentage of the population vaccinated remains below the threshold for herd immunity, leaving open the possibility of a prolonged pandemic with possible reinstitution of social distancing policies, travel restrictions, and quarantine measures. Due to this development, preemptive implementation of telemedicine services is highly encouraged to ensure remote access for patients to physicians and health care systems.

Chronic pain is associated with many psychiatric comorbidities, such as anxiety, depression, and physical functional impairment (29,35-37). These correlations were also evident in our study results. Patients who reported severe anxiety regarding their current pain symptoms were more likely to express changes in their sleep habits, appetite, and mood. These patients were also more likely to report needing to speak with their health care provider during the pandemic. Similarly, they were more likely to endorse functional impairment in their daily activities. These patients were also

Table 3. *Responses to Survey Questions 14-24.*

Question	Response	Percent
Q14. Do you have enough medication for you pain until you see your doctor?	No	20.9
	Yes	79.1
Q15. During this pandemic, have you ever experienced the urge to use more drugs than what was prescribed?	No	83.3
	Yes	16.7
Q16. During this pandemic, have you ever used alcohol to manage your pain?	No	83.3
	Yes	16.7
Q17. During this pandemic, have you ever used marijuana to manage your pain?	Yes	91.7
	No	7.8
Q18. During this pandemic, have you ever used any other recreational drugs to manage your pain?	No	98
	Yes	2
Q19. During this pandemic, have you needed to speak with your healthcare provider?	No	21.2
	Yes	78.8
Q20. During this pandemic, have you been engaged with your healthcare provider (messaging, phone calls, televisits)?	No	21.2
	Yes	78.8
Q21. Are you aware that your healthcare provider is available via telehealth?	No	12
	Yes	87.8
Q22. During this pandemic, did you have any consultations regarding your pain (including via PCP, televisits, etc.)?	No	37.7
	Yes	62.3
Q23a. Before the pandemic, were you engaged in any prescribed physical therapy?	No	57.1
	Yes	42.9
Q23b. Are you able to continue your prescribed physical therapy during the pandemic?	No	78.1
	Yes	9.2
	Not applicable	11.4
Q24a. Have you engaged in any other methods to manage your pain that have not been addressed by this survey?	No	62.1
	Yes	34.2
	Not Applicable	3.6
Q24b. If yes, please explain: _____	Exercise	69.1
	Heat/Ice Packs/ Creams	26.2
	Meditation/ Relaxation	9.4
	Massage	4.2
	Other	6.8

more likely to experience the urge to use more than their daily prescribed dose of medication to manage their pain. Based on these concerning findings, patients with comorbid psychiatric conditions such as anxiety or depression would benefit from a more frequent follow-up to reduce the risk of medication overuse/abuse, especially in light of existing evidence associating the link between psychiatric conditions and improper medication usage (38).

Our study results demonstrate that the reported severity of pain positively correlated with an increased likelihood of adjusting a daily prescribed medication dosage to sufficiently manage pain. As mentioned above, the degree of pain severity was also associated with an increased likelihood of experiencing the urge to use more medications than what was prescribed. Both of these factors place patients with chronic pain at a higher risk for opioid misuse (39). Given that pain severity is also associated with changes in sleep habits, appetite, and mood, it is vital to ensure adequate pain control and proper medication usage in these patients (40-43).

Regarding potential substance abuse, most of the patients in our study denied using alcohol, marijuana, and other recreational drugs for pain management. Additionally, most of these patients also reported a lack of desire to use more medication than what was prescribed. A plausible reason for this behavior could be the availability of sufficient pain medication refills or regular access to their health care team. Most notably, nearly three-fourths of our surveyed patients were actively engaged with their physicians via telemedicine.

Based on historical epidemics and pandemics, there was plausible concern regarding the potentially deleterious effects of COVID-19 on patient access to care and overall patient outcomes concerning their chronic medical conditions (7,44,45). However, the majority of patients who responded to the survey did not experience significant adverse outcomes due to the pandemic as a result of social distancing or due to quarantine measures in place. A majority of the survey patients also reported a sufficient supply of prescription medication and access to their health care providers. These findings could be due to the clinic initiative of implementing proactive policies and procedures following a statewide suspension of elective visits and procedures.

Proactive Policies and Procedures Implemented at the Pain Clinic

The clinic staff contacted all patients who had existing scheduled appointments to inform them of their

visit cancellation (due to hospital suspension of elective in-person services) and made them aware of the availability of telemedicine services. The clinic also took the following proactive measures to maintain patient engagement.

1) All patient inquiries via telephone calls were addressed within 24-48 hours (as is the clinic policy, even before the COVID pandemic).
2) As always, patients were encouraged to engage their medical teams via MyChart – an online communication tool for the Epic electronic medical record used in the clinic. Responses to electronic communication were similarly attended to within 24-48 hours.
3) We continued to route all emergency calls via a paging service to the on-call pager carried by the on-call resident or a fellow physician with an attending physician backup coverage if needed.
4) Telemedicine appointments were scheduled within 1-2 weeks of a patient calling for an appointment. Emergencies were seen within 24-48 hours. The pain clinic's routine practice remained the same; the only exception was the utilization of telemedicine rather than an in-person visit.

In our opinion, we believe that the utilization of telemedicine services as a surrogate for in-person visits, when feasible, is both an acceptable alternative and a reliable tool in maintaining continuity of care in the population with chronic pain when in-person services are not available. Accordingly, we recommend that all outpatient physicians, both specialized and in primary care settings, implement these tools and establish a robust technological infrastructure for telemedicine services, both as a contingency in the case of a protracted pandemic, or in the case of reimplementation of social distancing policies, travel restrictions, quarantine measures, and potential suspension of elective in-person patient visits.

Limitations

This cross-sectional study has multiple limitations. Our findings are from a selected patient cohort identified as high utilizers who are likely familiar with accessing and obtaining timely refills of medications. Hence, our results are not generalizable to all patients with chronic pain. Further, as all patients assessed in this study are from a single pain clinic in New York City, this may also affect the generalizability of the study.

We also recognize that our pain medication prescribing pattern may have also favorably affected the outcomes of the study. In our clinic, when possible and appropriate medically (and in compliance with state statute and insurance authorization), prescriptions may come with multiple refills, lasting several months. This long-term prescription of pain medication may not apply to many pain clinics.

Another potential limitation of the study is the lack of accounting for baseline behavior characteristics of the study patients, such as pain and anxiety level and functional status. It is difficult to comment on how quarantine measures may have affected these variables without adjusting for baseline measurements. As reported in our results, the majority of the surveyed patients denied any substance abuse issues. However, an inquiry regarding the survey patient's possible prior history of substance use was not made, either directly with the patients or through extensive searching of the patient's medical records.

Another limitation pertains to the potential effect of socioeconomic status on the variables mentioned above, as these data were not collected. However, given that the study was conducted at a single pain clinic in Bronx County, we expect the socioeconomic status of these patients to be largely homogenous and thus not likely to have a noticeable effect on the data collected. Finally, the survey was not conducted using validated questionnaires. However, we attempted to establish a certain degree of face validity by evaluating and scrutinizing the questions with a group of experts in chronic pain.

Several sources of bias also exist in our study. As some patients refused to participate and some were not reachable, there is potential selection bias. Despite a greater than 50% response rate, it does not represent a truly random selection of patients. Thus, results derived from the patients who participated in the survey may not be generalizable to those who could not be reached. Finally, the survey was conducted in June and July 2020, during the early months of the pandemic and social isolation policies. As this is a cross-sectional survey, it does not capture the entire quarantine period. Most importantly, the cross-sectional design is not suitable to demonstrate any temporal relationship between effects of quarantine measures and chronic pain. Consequently, the findings of this study need to be interpreted in a cautious manner.

Conclusion

According to our study's findings, despite the difficulties of the COVID -19 pandemic on health care de-

livery and access, chronic pain patients who remained engaged with their health care team or were aware of available telemedicine services reported minimal concerns regarding chronic pain and associated symptoms during the COVID-19 social distancing and quarantine period. Our study also indicates that the early implementation of virtual consults may have contributed to mitigating patient concerns. The study also identified the importance of effectively educating patients about available services to manage their pain symptoms and associated comorbidities. Finally, in anticipation of a protracted pandemic period and potential reimplementation of social distancing and quarantine policies, pain clinics should create standard operating protocols of communication with patients, set up reliable telemedicine services, and encourage patients to utilize these services more often as a reliable and acceptable surrogate for in-person visits as a prophylactic measure to reduce the spread of COVID-19.

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Appendix 1. *Study questionnaire.*

STUDY QUESTIONNAIRE

PAIN

1. On a scale from 0 to 10, with 0 being no pain and 10 being the worst pain imaginable, how would you rate your current pain?

0 1 2 3 4 5 6 7 8 9 10

2. How well-controlled is your pain currently?

1 2 3 4 5

Not controlled at all Slightly controlled Somewhat controlled Mostly controlled Completely controlled

3. How much does your pain impair your daily function and/or daily activities currently?

1 2 3 4 5

Impairs no function/activities Impairs little to no function/activities Impairs some function/activities Impairs most function/activities Impairs all function/activities

4. During this pandemic, how concerned are you that your pain will be out of control?

1 2 3 4

Not concerned at all Slightly concerned Somewhat concerned Very concerned

5. During the pandemic, have you had enough medication to treat your pain?

1-No 2-Yes

6. During this pandemic, have you ever taken more than your daily prescribed dose of medication to sufficiently manage your pain?

1-No 2-Yes

7. During this pandemic, have you ever taken less than your daily prescribed dose of medication in order to conserve your medication?

1-No 2-Yes

ANXIETY

8. Currently, how anxious do you feel regarding your pain?

1 2 3 4

Not anxious at all Slightly anxious Somewhat anxious Very anxious

9. How anxious do you feel regarding the current pandemic?

1	2	3	4
Not anxious at all	Slightly anxious	Somewhat anxious	Very anxious

10. How concerned are you that you would not be able to see a doctor when you needed to during this pandemic?

1	2	3	4
Not concerned at all	Slightly concerned	Somewhat concerned	Very concerned

11. During this pandemic, has your pain caused you to experience changes in your:

a. Sleep habits? 1-No 2-Yes
b. Appetite? 1-No 2-Yes
c. Mood? 1-No 2-Yes

12. During this pandemic, have you felt isolated?

1-No 2-Yes

13. Have you felt anxious about not being able to return to school or work because of the pain during the pandemic?

1-No 2-Yes 3-Not applicable

SUBSTANCE USE

14. Do you have enough medication for your pain until you see your doctor?

1-No 2-Yes

15. During this pandemic, have you ever experienced the urge to use more drugs than what was prescribed?

1-No 2-Yes

16. During this pandemic, have you ever used alcohol to manage your pain?

1-No 2-Yes

17. During this pandemic, have you ever used marijuana to manage your pain?

1-No 2-Yes

18. During this pandemic, have you ever used any other recreational drugs to manage your pain?

1-No 2-Yes

ENGAGEMENT IN HEALTHCARE ACTIVITY

19. During this pandemic, have you needed to speak with your healthcare provider?

1-No 2-Yes

20. During this pandemic, have you been engaged with your healthcare provider (including messaging, phone calls, televisits)?

1-No 2-Yes

21. Are you aware that your healthcare provider is available via telehealth?

1-No 2-Yes

22. During this pandemic, did you have any consultations regarding your pain (including via your PCP, televisits, etc.)?

1-No 2-Yes

23a. Before the pandemic, were you engaged in any prescribed physical therapy?

1-No 2-Yes

23b. Are you able to continue your prescribed physical therapy during the pandemic?

1-No 2-Yes

Open-Ended Question:

24a. Have you engaged in any other methods to manage your pain that have not been addressed by this survey?

1-No 2-Yes

24b. If yes, please explain: _____