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ORIGINAL RESEARCH

Impact of COVID-19 Pandemic on Prescribing of Long-Acting Injectable Antipsychotics for Schizophrenia: Results from a United States Prescriber Survey

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Purpose: To describe changes due to the COVID-19 pandemic in the prescribing of long-acting antipsychotics (LAI) for schizophrenia, patient outcomes, and patient and healthcare provider (HCP) attitudes regarding COVID-19 vaccination in the United States (US).

Methods: An anonymous online survey was administered to US-based LAI prescribers with a psychiatry specialty in May 2021. Information on prescriber and clinical practice characteristics, LAI prescribing, patient outcomes, and attitudes toward COVID-19 vaccination was collected and described.

Results: Of the 401 LAI prescribers meeting survey criteria, 64.6% reported that LAI prescribing remained unchanged (increase: 19.2%, decrease: 14.0%). The majority did not switch patients from LAIs to oral antipsychotics (OAP; 63.3%) or to LAI formulations with lower frequency of administration (68.1%); most prescribers switched the same number of patients from OAPs to LAIs during the pandemic as in previous practice (65.1%). Half of LAI prescribers (50.1%) reported antipsychotic adherence as unchanged among most patients; 44.6% reported symptom control/relapse frequency as unchanged. Most prescribers believed their patients with schizophrenia should be prioritized for COVID-19 vaccination (74.1%) and encouraged all patients to obtain a COVID-19 vaccine (84.0%). However, 64.1% of prescribers reported hesitancy among some patients about vaccines' safety; 51.4% reported that some patients were willing to be vaccinated despite the hesitancy, 48.6% indicated that some patients perceived COVID-19 vaccines as safe, effective, and important.

Conclusion: LAI prescribing and prescriber-reported antipsychotic adherence in patients with schizophrenia remained largely unchanged approximately one year after the start of COVID-19. Focused efforts to overcome patients' COVID-19 vaccine hesitancy are warranted.

Keywords: adherence, antipsychotics, COVID-19, physician survey, prescribing habits, schizophrenia

Introduction

Schizophrenia is a chronic, heterogenous psychiatric disorder involving various clinical dimensions, including positive symptoms (eg, delusions and hallucinations), negative symptoms (eg, anhedonia, social withdrawal, blunted affect), disorganized behavior, and impaired cognitive or executive function.[1,2] The estimated prevalence of schizophrenia is between 0.25% and 0.64% in the United States (US), with an incidence of 1.5 per 10,000 people.[3–5] Despite the relatively low prevalence, schizophrenia is associated with substantial health, societal, and economic burden, including high healthcare resource utilization[6–8] and increased risk of premature mortality, disability, mental health comorbidities, and suicide.[9–15] Furthermore, the difficult symptoms associated with schizophrenia profoundly decrease patients' quality of life and daily functioning.[16,17]

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As a result of confirmed cases of illness caused by a SARS-CoV-2 Novel Coronavirus (2019-nCoV or COVID-19), the US Secretary of Health and Human Services determined the existence of a public health emergency on January 27, 2020.[18] The COVID-19 pandemic has placed at risk certain in-person encounters with healthcare providers that are essential for the stability of patients with schizophrenia,[19,20] including the administration of long-acting injectable antipsychotics (LAIs). Antipsychotic therapy is a mainstay of care for schizophrenia,[1] and LAIs have well-recognized clinical utility, partially due to their reduced frequency of administration compared with daily oral antipsychotics (OAPs).[21–23] Previous evidence has demonstrated improved adherence to LAI therapy and symptom control relative to OAPs[21–23] and reduced rates of hospitalization and relapse.[24,25] The disruption of the continuity of care in schizophrenia, including LAI administration, might result in patient decompensation and relapse.[26] In the context of a global pandemic, it could also place an additional strain on the healthcare system, further increasing emergency department visits and hospitalizations, as well as contributing to COVID-19 transmission.[20] Given the benefits of prescribing LAIs on the one hand and the challenges of in-person care provision during the COVID-19 pandemic on the other, it is important to understand ways in which the pandemic has affected treatment decisions and treatment outcomes among patients with schizophrenia.

Besides disruptions to in-person healthcare provision, the COVID-19 pandemic may also directly affect health outcomes of patients with mental illness.[27] People with schizophrenia may be at a higher risk of COVID-19 transmission due to factors such as cognitive impairment, lower awareness of risk, and barriers to adequate infection control including congregate living.[28] Moreover, a higher risk of mortality has been observed in people with schizophrenia and COVID-19,[29] underscoring the need for education on prevention and prompt access to safe and efficacious vaccines.[30] In these circumstances, psychiatrists might have a critical role in moving patients, particularly the mentally ill, from hesitancy to vaccine confidence and acceptance.[31]

To this end, we conducted a survey among healthcare providers (HCPs) in the US who treat patients with schizophrenia with LAIs (ie, LAI prescribers) to assess changes in their prescribing habits and perceived patient health outcomes prior to and during the pandemic, as well as to understand their attitudes and perceptions of their patients' attitudes regarding COVID-19 vaccination.

Methods

Data Source

Survey Instrument

De-identified, individual-level data was collected nationwide between May 10 and May 25, 2021, through an anonymous cross-sectional double-blinded online survey administered to US-based HCPs with a psychiatry specialty. Participants were recruited from an online physician panel via a third-party vendor (Dynata, LLC) and provided their informed consent prior to responding to the survey questions. All study materials were reviewed by the WIRB-Copernicus Group Independent Review Board, which granted an exemption determination on April 19, 2021 per Title 45 of CFR, Part 46.104(d)(2) as no personally identifiable information was collected.[32]

The survey collected information on characteristics of participating LAI prescribers, prescriber-reported changes in LAI prescribing habits and perceived patient outcomes during the COVID-19 pandemic, as well as prescriber and perceived patient attitudes toward COVID-19 vaccination. To facilitate survey completion, measures were taken to provide lists of potential response categories to all questions, with the option to select "other" and type in a free-text response if the provided categorical answers did not cover the intended response.

Quality control measures were implemented (ie, consistency and range checks) to resolve any conflicts in the data and presented survey respondents with prompts to allow for confirmation or revision of answers. The survey was tested prior to a full launch among a subset of LAI prescribers to ensure all questions were clear and correctly interpreted. The quality and accuracy of completed surveys were reviewed after de-identification, and data were cleaned, cross-checked, and aggregated. All completed surveys passed the quality checks, and no respondent was excluded because of data quality issue.

Study Participants

The participants in this study were US-based HCPs who met the following criteria: 1) had a specialty in psychiatry; 2) had practiced psychiatry for ≥2 years and were employed by the same clinical practice since January 2019; and 3) had treated patients with schizophrenia with LAIs since January 2019.

Statistical Analyses

All survey responses were categorical and as such were summarized descriptively using frequencies and proportions. Free-text responses given as "other" responses to categorical questions were reported in the tables either categorically or in the footnotes. Completed surveys did not contain missing data because answers to all questions were required. All analyses were conducted using SAS Enterprise Guide 7.1 (SAS Institute, Cary, NC).

Results

Characteristics of LAI Prescribers and Their Clinical Practice

A total of 401 LAI prescribers met all study criteria and completed the online survey (Table 1). Most respondents were physicians (79.8%), 14.0% were nurse practitioners, 4.7% were physician assistants, and 1.5% were pharmacists. Half of

Table 1 Characteristics and Clinical Practice of LAI Prescribers

n (%)	Prescribers of LAIs N = 401
Job title	
Physician	320 (79.8%)
Nurse practitioner	56 (14.0%)
Physician assistant	19 (4.7%)
Pharmacist	6 (1.5%)
Years of practice in psychiatry	
2–4 years	35 (8.7%)
5–10 years	93 (23.2%)
11–15 years	71 (17.7%)
>15 years	202 (50.4%)
Clinical setting	
Private practice	100 (24.9%)
Community health center	90 (22.4%)
Outpatient clinic of hospital	73 (18.2%)
Inpatient unit of psychiatric hospital	55 (13.7%)
Inpatient psychiatry unit of general hospital	35 (8.7%)
Academic practice	25 (6.2%)
Long-term care	8 (2.0%)
Program of assertive community treatment (PACT)	7 (1.7%)
None of the above	8 (2.0%)
Do not know/unsure	0 (0.0%)
Type of geographic area of clinical practice	
Urban area (≥50,000 people)	272 (67.8%)
Urban cluster (2500–49,999 people)	107 (26.7%)
Rural (<2500 people)	21 (5.2%)
Do not know/unsure	1 (0.2%)
US geographic region of clinical practice	
South	132 (32.9)
Northeast	104 (25.9)
Midwest	85 (21.2)
West	80 (20.0)

(*Continued*)

Table 1 (Continued).

n (%)	Prescribers of LAIs N = 401
Services provided at clinical practice	
Counseling (individual, family, group)	329 (82.0%)
LAI administration services	312 (77.8%)
Social work/ referral services	275 (68.6%)
Pharmacy	162 (40.4%)
Peer specialists	123 (30.7%)
Crisis center	120 (29.9%)
Occupational/rehabilitation services	96 (23.9%)
Partial hospitalization program	96 (23.9%)
Day programs	90 (22.4%)
None of the above	17 (4.2%)
Do not know/unsure	0 (0.0%)

Abbreviations: COVID-19, coronavirus disease of 2019; LAI, long-acting injectable; US, United States.

the LAI prescribers (50.4%) had over 15 years of practice in psychiatry and over two-thirds (68.1%) had over 10 years of practice. The most common clinical practice settings were private practices (24.9%), community health centers (22.4%), and the outpatient clinics of hospitals (18.2%). Almost all surveyed LAI prescribers practiced in urban geographical settings (urban areas [67.8%] or urban clusters [26.7%]). The majority of practices provided individual, family, or group counseling (82.0%), LAI administration services (77.8%), and social work/referral services (68.6%). The survey respondents were generally evenly distributed across US geographic regions, with a slightly higher proportion in the South US (32.9%).

LAI Prescribing Patterns in 2019 and During the COVID-19 Pandemic

Overall Prescribing of LAIs

Approximately two-thirds of LAI prescribers (64.3%) reported treating more than five patients with schizophrenia with LAIs per month in 2019 (Table 2). Most reported that LAI prescribing rates remained unchanged during the COVID-19 pandemic (64.6%), while 19.2% reported an increase and 14.0% reported a decrease in LAI prescribing rates. The most commonly prescribed LAIs both before and during the COVID-19 pandemic were reported to be 1-month paliperidone palmitate (84.0% and 80.9%, respectively), aripiprazole (83.8% and 77.8%), and haloperidol decanoate (74.6% and 65.8%). During an average prescribing encounter, most LAI prescribers (85.3%) reported spending between 11 and 30 minutes with each patient. For nearly two-thirds of LAI prescribers (64.6%), the COVID-19 pandemic did not impact the duration of time spent with patients.

Switching Patients from LAIs to OAPs During COVID-19 Pandemic

Approximately two-thirds (63.3%) of LAI prescribers did not switch patients with schizophrenia from LAIs to OAPs during the COVID-19 pandemic, while 33.7% did (Figure 1A). Among those who switched patients to OAPs (n = 135), the most common reasons for the switch were concerns about patients skipping injections due to COVID-19 (59.3%) and requests from patients or their caregivers (58.5%) (Figure 1B).

Switching Patients from OAPs to LAIs During COVID-19 Pandemic

Approximately two-thirds of LAI prescribers (65.1%) switched the same number of patients from OAPs to LAIs during the COVID-19 pandemic as per their routine previous practice, while 19.7% switched more patients and 12.2% switched fewer patients (Figure 2A). Among those who switched more patients to LAIs (n = 79), the most common reasons for the switch were better adherence and symptom control with LAIs over OAPs (78.5%) and patients'/caregivers' requests (53.2%) (Figure 2B). Among those who switched fewer patients to LAIs (n = 49), the most common reasons against

Table 2 LAI Prescribing Patterns During the COVID-19 Pandemic

n (%)	Prescribers of LAIs N = 401
Patients treated with LAIs in an average month in 2019	
None	4 (1.0%)
1–2 patients	46 (11.5%)
3–5 patients	82 (20.4%)
6–10 patients	108 (26.9%)
>10 patients	150 (37.4%)
Do not know/unsure	11 (2.7%)
Change in the absolute number of patients treated with LAIs during COVID-19 pandemic	
Remained unchanged	259 (64.6%)
Increased	77 (19.2%)
Decreased	56 (14.0%)
Do not know/unsure	9 (2.2%)
Average time spent with a patient during an encounter[a]	
≤10 minutes	4 (1.0%)
11–20 minutes	150 (37.4%)
21–30 minutes	192 (47.9%)
>30 minutes	55 (13.7%)
Do not know/unsure	0 (0.0%)
Change in average time spent with a patient during an encounter during COVID-19[a]	
Increased	68 (17.0%)
Remained unchanged	259 (64.6%)
Decreased	73 (18.2%)
Do not know/unsure	1 (0.2%)

Note: [a]Excludes first encounters of prescribers with patients.
Abbreviations: COVID-19, coronavirus disease of 2019; LAI, long-acting injectable.

making the switch were concerns with patients skipping injections due to COVID-19 (73.5%) and the risk of COVID-19 transmission (67.3%) (Figure 2C).

Switching Patients to LAI Formulations with Lower Frequency of Administration During COVID-19 Pandemic

Over two-thirds (68.1%) of LAI prescribers did not switch patients to LAI formulations with lower frequency of administration during the COVID-19 pandemic, while 25.9% did (Figure 3A). Among those who did not switch patients (n = 273), the most common reason for the decision was the lack of medical need (58.6%) (Figure 3B). Among those who switched patients (n = 104), the most common reasons for the decision were reduced risk of COVID-19 transmission (75.0%) and better adherence and symptom control with lower frequency formulations (52.9%) (Figure 3C).

Prescriber-Reported Antipsychotic Adherence and Treatment Efficacy During the COVID-19 Pandemic

Changes in Patients' Adherence to Antipsychotic Therapy During COVID-19 Pandemic

Half of LAI prescribers (50.1%) reported that antipsychotic adherence remained unchanged for the majority of patients during the COVID-19 pandemic and 22.2% reported no clear overall trend in adherence (eg, an increase in some patients and a decrease in others) (Figure 4A). On the other hand, a decrease in antipsychotic adherence in most patients was reported by 15.7% of LAI prescribers, while an increase in most patients' adherence was reported by 5.7%.

Among LAI prescribers who reported improved antipsychotic adherence in some or most patients (n = 112), the most common reason cited was that increased use of telehealth improved the ability to reach patients (70.5%); other commonly

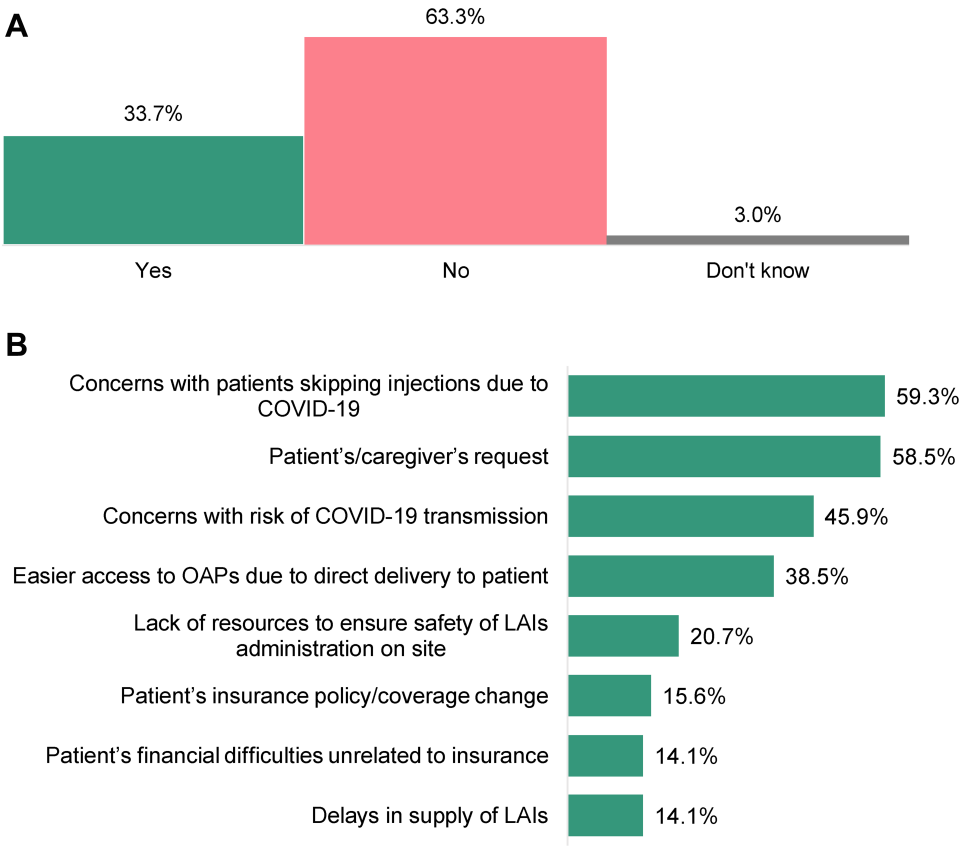

Figure 1 Switching patients from LAIs to OAPs during COVID-19 pandemic. (**A**) Percentage of HCPs who reported switching patients from LAIs to OAPs during the COVID-19 pandemic (N=401). (**B**) HCP-reported reasons for switching from LAIs to OAPs among HCPs who reported switching (n=135).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional; LAI, long-acting injectable; OAP, oral antipsychotic.

cited reasons included shared decision-making with patients/caregivers (44.6%) and switching from OAPs to LAIs (42.9%) (Figure 4B). Among LAI prescribers who reported decreased antipsychotic adherence in some or most patients (n = 152), the most commonly cited reasons were patients' social isolation (78.3%), lack of in-person contact with patients (64.5%), and patients' fear of COVID-19 exposure (60.5%) (Figure 4C).

Changes in Symptom Control and Relapse Frequency During COVID-19 Pandemic

Slightly less than half of LAI prescribers (44.6%) reported that symptom control and relapse frequency remained unchanged for the majority of patients during the COVID-19 pandemic, while 22.2% reported no clear overall trend (ie, an increase in some patients and a decrease in others) (Figure 5A). However, 18.2% of LAI prescribers reported that symptom control and relapse frequency worsened in most patients while 8.5% reported an improvement in most patients (Figure 5A).

Among LAI prescribers who reported an improvement in symptom control and relapse frequency in some or most patients (n = 123), most cited it was due to the increased use of telehealth making patients easier to reach (68.3%) as well as due to the use of shared decision-making with patients/caregivers (52.0%) (Figure 5B). Among those who reported a decrease in symptom control and relapse frequency in some or most patients (n = 162), the reasons most frequently given were patients' social isolation (77.8%), lack of in-person contact with patients (64.8%), and patients' fear of COVID-19 exposure making them more symptomatic (52.5%) (Figure 5C).

Healthcare Provisions During the COVID-19 Pandemic

During the COVID-19 pandemic, most of the LAI prescribers (85.0%) reported using telehealth whenever possible; it was the most frequently used safety measure to protect patients and staff from COVID-19 exposure at their clinical practice (Table 3). Other commonly reported safety measures included screening patients for COVID-19 symptoms/

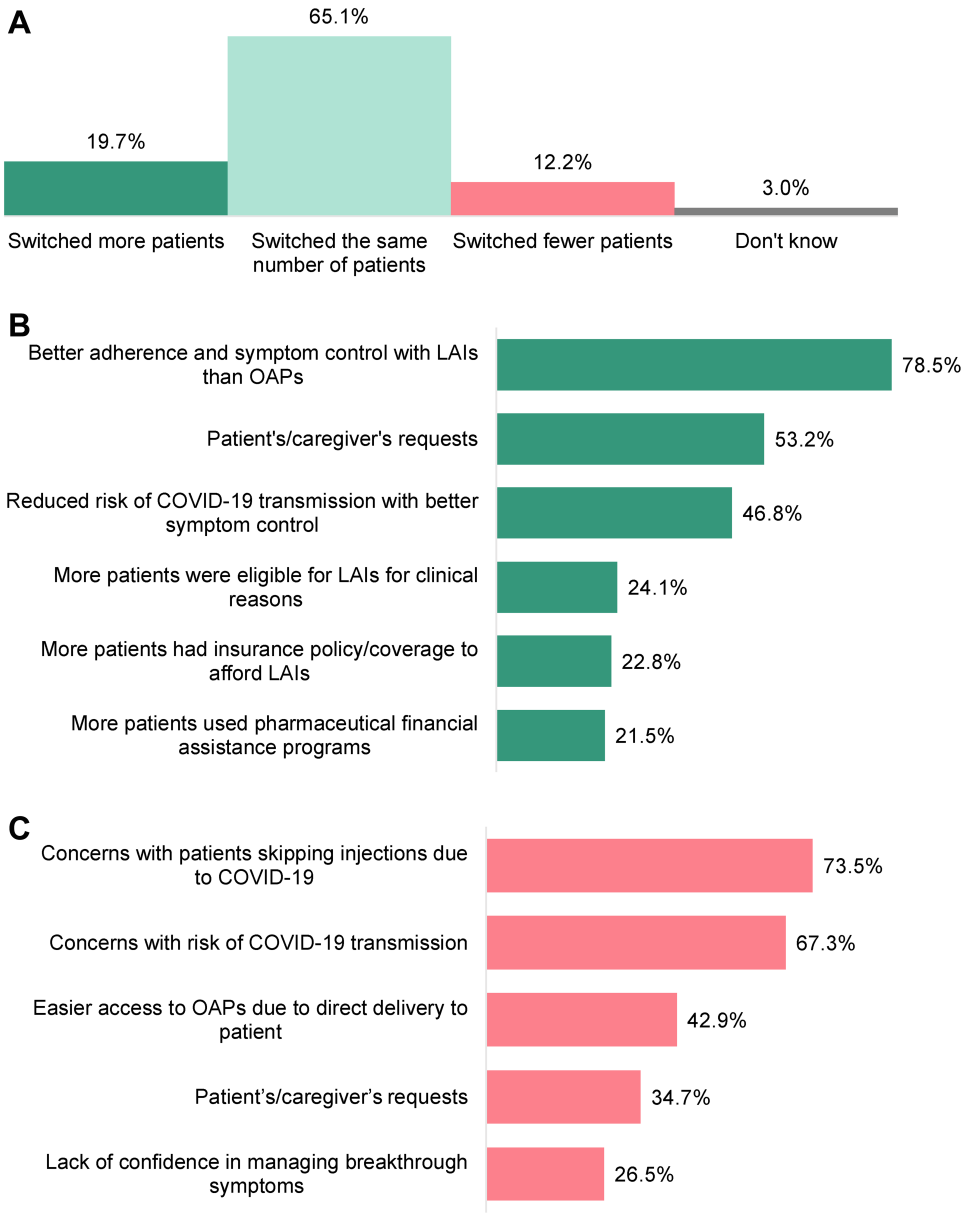

Figure 2 Switching patients from OAPs to LAIs during the COVID-19 pandemic. (**A**) HCP-reported changes in switching from OAPs to LAIs during the COVID-19 pandemic (N=401). (**B**) HCP-reported reasons for switching from OAPs to LAIs among HCPs who reported switching more patients (n=79). (**C**) HCP-reported reasons for switching fewer patients from OAPs to LAIs among HCPs who reported switching fewer patients (n=49).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional; LAI, long-acting injectable; OAP, oral antipsychotic.

exposure before appointment (73.6%), providing personal protective equipment to administer LAIs on site (68.3%), and minimizing contact between patients (ie, by staggering appointments, increasing waiting room capacity, installing physical barriers, etc. [62.6%]).

Among the LAI prescribers who used telehealth during the pandemic (n = 341), the most frequently named positive aspects of telehealth were maintaining contact with patients (84.8%), helping to monitor patients treated with LAIs between injections (53.7%), and allowing for visibility into patients' living conditions and better understanding of patients' treatment needs (53.4%) (Table 3). However, over half of the LAI prescribers (57.8%) experienced challenges maintaining contact with patients through telehealth due to patients lacking access to technology, which is the most commonly reported negative aspect of telehealth.

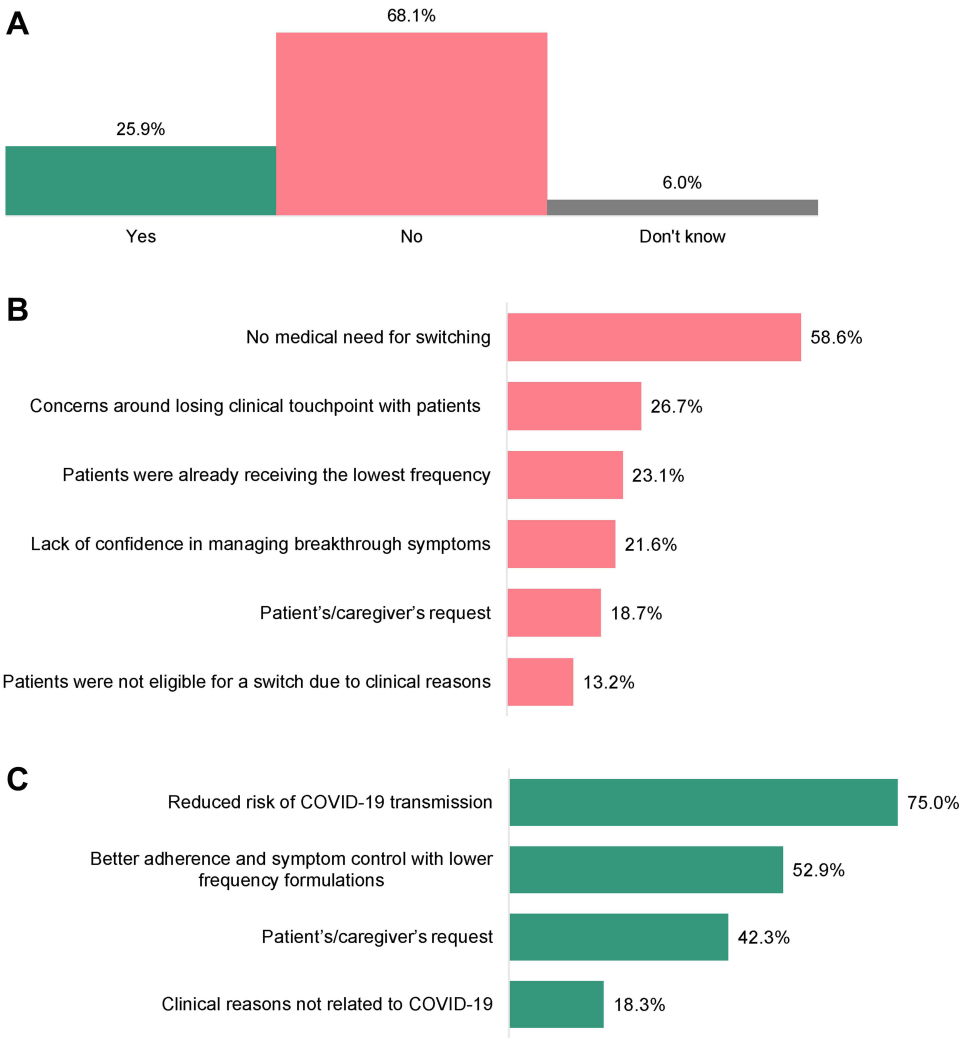

Figure 3 Switching patients to LAI formulations with lower frequency of administration during the COVID-19 pandemic. (**A**) Percentage of HCPs who reported switching patients to LAI formulations with lower frequency of administration during the COVID-19 pandemic (N=401). (**B**) HCP-reported reasons for not switching patients to formulations with lower frequency of administration among HCPs who reported not switching (n=273). (**C**) HCP-reported reasons for switching patients to formulations with lower frequency of administration among HCPs who reported switching (n=104).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional; LAI, long-acting injectable; OAP, oral antipsychotic.

Nearly all LAI prescribers (92.1%) involved patients/caregivers in decision-making regarding the best treatment plan; 72.1% reported that patients/caregivers discussed and provided consent for treatment plans, 62.3% reported asking patients about including caregivers in treatment decisions, and 52.6% reported asking patients to approve treatment plans.

Attitudes of LAI Prescribers to COVID-19 Vaccination for Patients with Schizophrenia

Prioritizing Patients with Schizophrenia for COVID-19 Vaccination

Approximately three-fourths of LAI prescribers (74.1%) believed that patients with schizophrenia should be prioritized for COVID-19 vaccination (Figure 6A). Among these respondents (n = 297), the most common reason for prioritization was concerns about the higher risk of severe consequences of COVID-19 for patients with schizophrenia (83.5%) (Figure 6B). Concerns about patients posing a higher risk of contracting (69.7%) or transmitting (63.0%) COVID-19 were also commonly cited as reasons for vaccine prioritization.

Encouraging Patients with Schizophrenia to Be Vaccinated Against COVID-19

Most of the surveyed LAI prescribers (84.0%) encouraged all their patients with schizophrenia to receive a COVID-19 vaccine, and additionally 10.7% stated that they encouraged some but not all patients to be vaccinated (Figure 7A). The

Figure 4 Changes in antipsychotic adherence during the COVID-19 pandemic. (**A**) HCP-reported changes in antipsychotic adherence during the COVID-19 pandemic (N=401). (**B**) HCP-reported reasons for increased antipsychotic adherence among HCPs who reported an increase in some or the majority of patients (n=112). (**C**) HCP-reported reasons for decreased antipsychotic adherence among HCPs who reported a decrease in some or majority of patients (n=152).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional; LAI, long-acting injectable; OAP, oral antipsychotic.

most frequently cited reasons for encouraging vaccination were the belief that everyone should be vaccinated regardless of underlying conditions (among those who encouraged all patients [n = 337]: 68.2%; some patients [n = 43]: 58.1%) and concern of the higher risk of severe consequences from COVID-19 among patients with schizophrenia (67.7% and 48.8%, respectively) (Figure 7B and C). Among LAI prescribers who did not encourage certain patients to be vaccinated, the most common reasons were patients not meeting the criteria for the current phase of vaccinations (27.9%) and lack of contact with patients (25.6%) (Figure 7D).

Just 2.2% of LAI prescribers (1.9% of physicians, 5.4% of nurse practitioners, and no physician assistants or pharmacists) did not encourage patients to receive a COVID-19 vaccine (Figure 7A). Among these respondents (n = 9), the most common reasons for not encouraging vaccination were the lack of information about different vaccines and their impact on patients with schizophrenia (33.3%) and the belief that vaccination is a personal choice (33.3%) (Figure 7E).

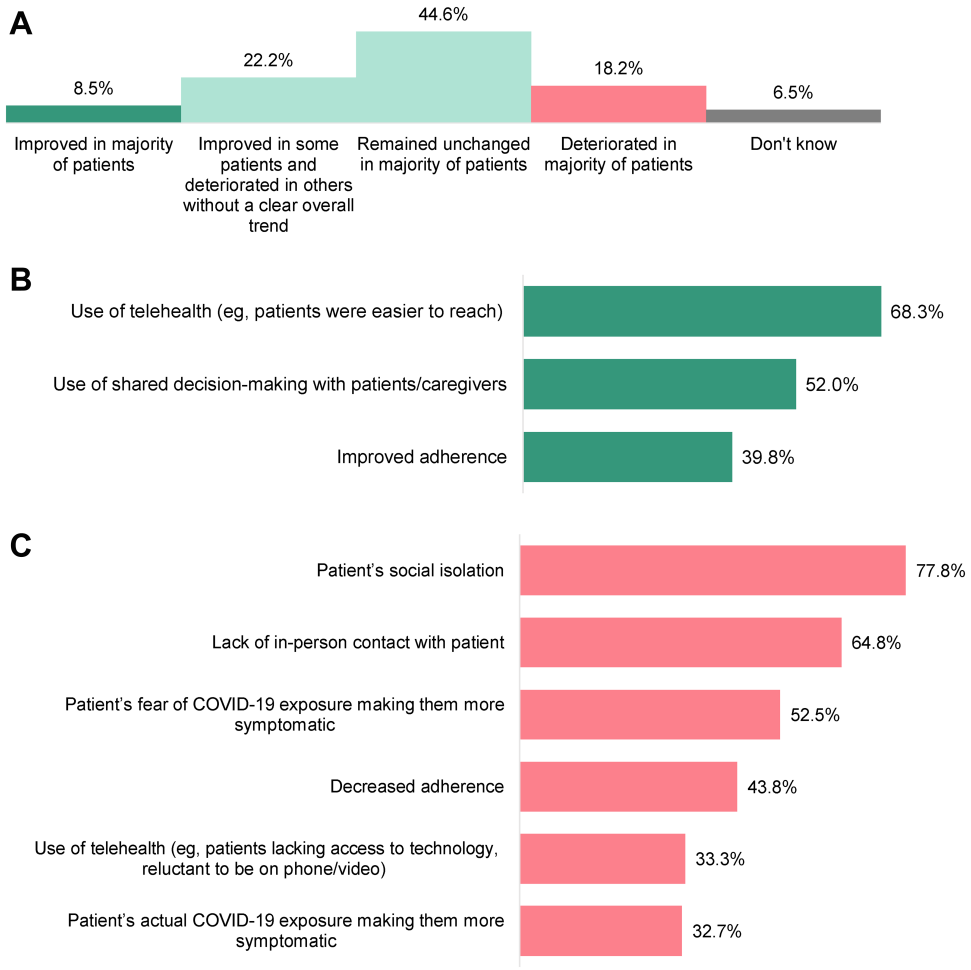

Figure 5 Changes in symptom control and relapse frequency during the COVID-19 pandemic. (**A**) HCP-reported changes in symptom control and relapse frequency during the COVID-19 pandemic (N=401). (**B**) HCP-reported reasons for increased symptom control among HCPs who reported an increase in some or majority of patients (n=123). (**C**) HCP-reported reasons for deteriorated symptom control among HCPs who reported a deterioration in some or majority of patients (n=162).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional; LAI, long-acting injectable; OAP, oral antipsychotic.

Attitudes of Patients with Schizophrenia on COVID-19 Vaccination Reported by LAI Prescribers

Two-thirds of LAI prescribers (64.1%) reported hesitancy among some patients regarding COVID-19 vaccine safety, although half (51.4%) of the LAI prescribers reported that despite hesitancy regarding vaccine safety or efficacy, some patients were willing to be vaccinated to minimize the risks of COVID-19 (Figure 8). Approximately half of LAI prescribers (48.6%) indicated that some patients perceived COVID-19 vaccines as safe, effective, and important. However, a third of LAI prescribers (32.4%) reported that some patients were unwilling to be vaccinated and unconcerned with COVID-19 consequences.

Discussion

This survey of US-based LAI prescribers treating patients with schizophrenia revealed that LAI prescribing habits and perceived patient adherence to antipsychotics remained largely unchanged during the COVID-19 pandemic. Telehealth and in-clinic safety measures were widely employed to maintain contact with patients and reduce infection risk. However, more LAI prescribers reported that their patients' antipsychotic adherence and symptom control had deteriorated than improved. The LAI prescribers who switched patients to LAIs with lower frequency of administration or to OAPs aimed to reduce the risk of patients skipping LAI injections or COVID-19 transmission and

Table 3 Healthcare Provisions During the COVID-19 Pandemic

n (%)	Prescribers of LAIs N = 401
Safety measures taken at the clinical practice to protect patients and staff from COVID-19 exposure	
Use of telehealth whenever possible	341 (85.0%)
Screening for COVID-19 symptoms/exposure before appointment	295 (73.6%)
Providing personal protective equipment to administer LAIs on site	274 (68.3%)
Minimizing contact between patients by staggering appointments, increasing waiting room capacity, installing physical barriers, etc.	251 (62.6%)
Administering LAIs on site in large, well-ventilated areas	145 (36.2%)
Temporary closure of practice during the COVID-19 pandemic	101 (25.2%)
Referring to alternate site of care to administer LAIs (eg, pharmacy)	64 (16.0%)
Providing/referring to home nursing services to administer LAIs	53 (13.2%)
Do not know/unsure	9 (2.2%)
Other[a]	2 (0.5%)
Perspectives on telehealth use during COVID-19 pandemic	341 (85.0%)
Positive aspects	
Allowed for maintaining contact with patients	289 (84.8%)
Helped to monitor patients treated with LAIs between injections	183 (53.7%)
Allowed for visibility into patients' living conditions and improved understanding of patients' treatment needs	182 (53.4%)
Patients felt more comfortable during appointments and cooperated more in choosing/adhering to a treatment plan	180 (52.8%)
Helped to ensure adherence among patients treated with OAPs	177 (51.9%)
Telehealth has had no positive aspects	10 (2.9%)
Do not know/unsure	7 (2.1%)
Reduced travel burden	5 (1.5%)
Negative aspects	
More challenging to maintain contact with patients due to them lacking access to technology	197 (57.8%)
More challenging to maintain contact with patients due to their reluctance to be on the phone or video	124 (36.4%)
Patients were less engaged or stable during appointments and cooperated less in choosing/adhering to a treatment plan	106 (31.1%)
Telehealth has had no negative aspects	69 (20.2%)
Difficulty in clinical assessment and monitoring	12 (3.0%)
Technical challenges (eg, connection, audio, video)	4 (1.0%)
Other[b]	4 (1.0%)
Do not know/unsure	11 (3.2%)
Ways to include patients/caregivers in decisions on the best treatment plan during COVID-19	
Patients/caregivers discussed and provided consent for treatment plan decisions	289 (72.1%)
Patients have been asked about including caregivers in treatment decisions	250 (62.3%)
Patients/caregivers have been asked to approve treatment plan	211 (52.6%)
Do not know/unsure	25 (6.2%)
Patients/caregivers have not been involved in treatment decisions	7 (1.7%)
Patients/caregivers have been included in other ways[c]	5 (1.2%)

Notes: [a]Includes other responses: "none" (n=1) and "repurposing our NP due to staff shortage" (n=1). [b]Includes other responses: "it promotes isolation which is detrimental to mental health" (n=1), "assistant staff members burn out" (n=1), "payments from insurance are less" (n=1), and "now having trouble getting patients back into the office" (n=1). [c]Includes other responses: "assist in monitoring adherence and providing medications", (n=1) "assist in getting patients to appointments" (n=1), "information mailed to them" (n=1), "collateral info /med records from family is extremely helpful" (n=1), "providing observations of behavior" (n=1), and "social/economic support to pts" (n=1).

Abbreviations: COVID-19, coronavirus disease of 2019; LAI, long-acting injectable; NP, nurse practitioner; OAP, oral antipsychotics.

prescribers who switched from OAPs to LAIs were primarily motivated by better adherence and symptom control with LAIs. Most LAI prescribers believed that patients with schizophrenia needed to be prioritized for COVID-19 vaccination and encouraged their patients to become vaccinated; very few LAI prescribers did not encourage vaccination. Additionally, while most LAI prescribers reported COVID-19 vaccine hesitancy among some of their

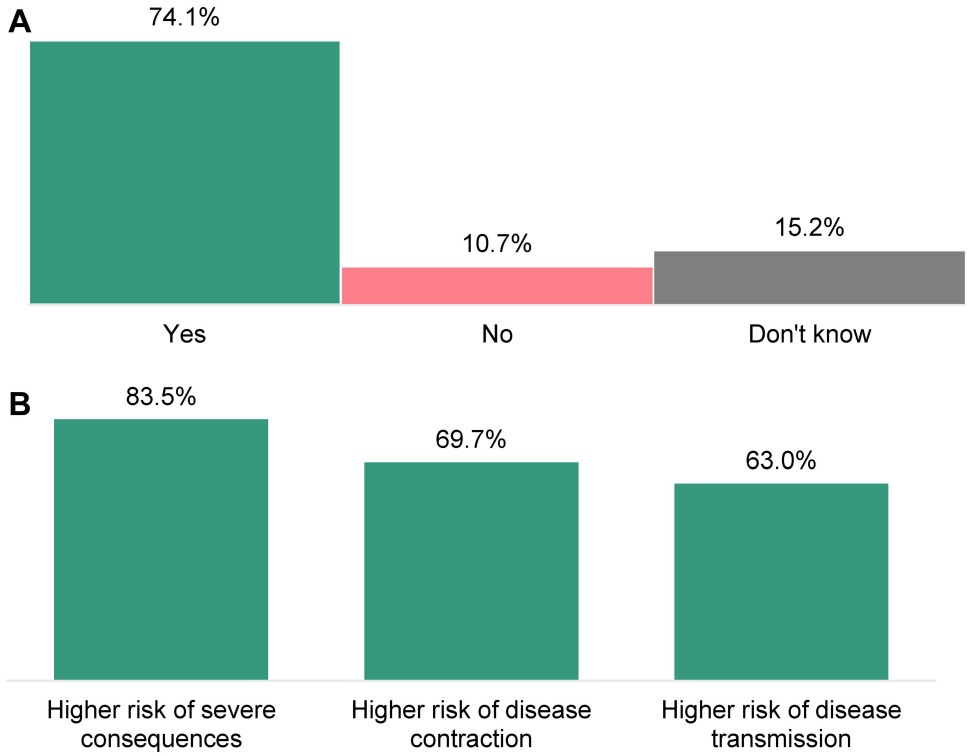

Figure 6 Attitudes of HCPs toward prioritizing patients with schizophrenia for COVID-19 vaccination. (**A**) Should patients with schizophrenia be prioritized for COVID-19 vaccination? (N=401). (**B**) Reasons for prioritizing patients with schizophrenia for COVID-19 vaccination (n=297).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional.

patients, over half indicated that they had patients who expressed willingness to be vaccinated to minimize COVID-19 risks.

Our finding of largely unchanged LAI prescribing during the pandemic is consistent with the American Psychiatric Association's (APA) COVID-19 Pandemic Guidance encouraging healthcare facilities to include the ongoing use of LAIs for patients with high-risk chronic psychiatric illness as a necessary procedure.[33] Further, it is consistent with a report by Gannon et al, who found that LAI prescribing largely remained stable before and after the implementation of social distancing and COVID-19 restrictions in March 2020 at a Pittsburgh ambulatory clinic.[19]

The surveyed LAI prescribers who switched more patients from OAPs to LAIs during the COVID-19 pandemic primarily did so because they expected better adherence and symptom control with LAIs. As a chronic disease, schizophrenia requires ongoing, long-term treatment to control symptoms and prevent relapse. However, a confluence of factors (ie, lack of insight or stability, cognitive impairment, bothersome medication side effects, etc.) create challenges for treatment that often result in suboptimal adherence to antipsychotic therapy.[34–36] Prior studies have consistently demonstrated strong evidence of the clinical utility of LAIs in improving adherence and symptom control due in part to the lower frequency of administration compared with daily OAPs.[21–23,37]

This study revealed that both prescribers and patients/caregivers were mindful of strategies reducing the impact of COVID-19 on LAI treatment. About a third of the surveyed LAI prescribers reported switching patients from LAIs to OAPs during the COVID-19 pandemic, primarily due to concerns of patients skipping injections and as a result of patients'/caregivers' request. Conversely, about one-fourth of LAI prescribers switched patients to LAI formulations with lower frequency of administration to reduce the risk of COVID-19 transmission from in-person healthcare visits. A recent Romanian study suggested that switching from LAIs to OAPs during COVID-19 was mainly requested by patients/caregivers to reduce the number of in-person visits to pharmacies, medical offices, or public mental health centers in the context of the pandemic.[38] A patient's individual living and/or caregiver situation may impact which medications are most convenient and have the lowest perceived risk to acquire.

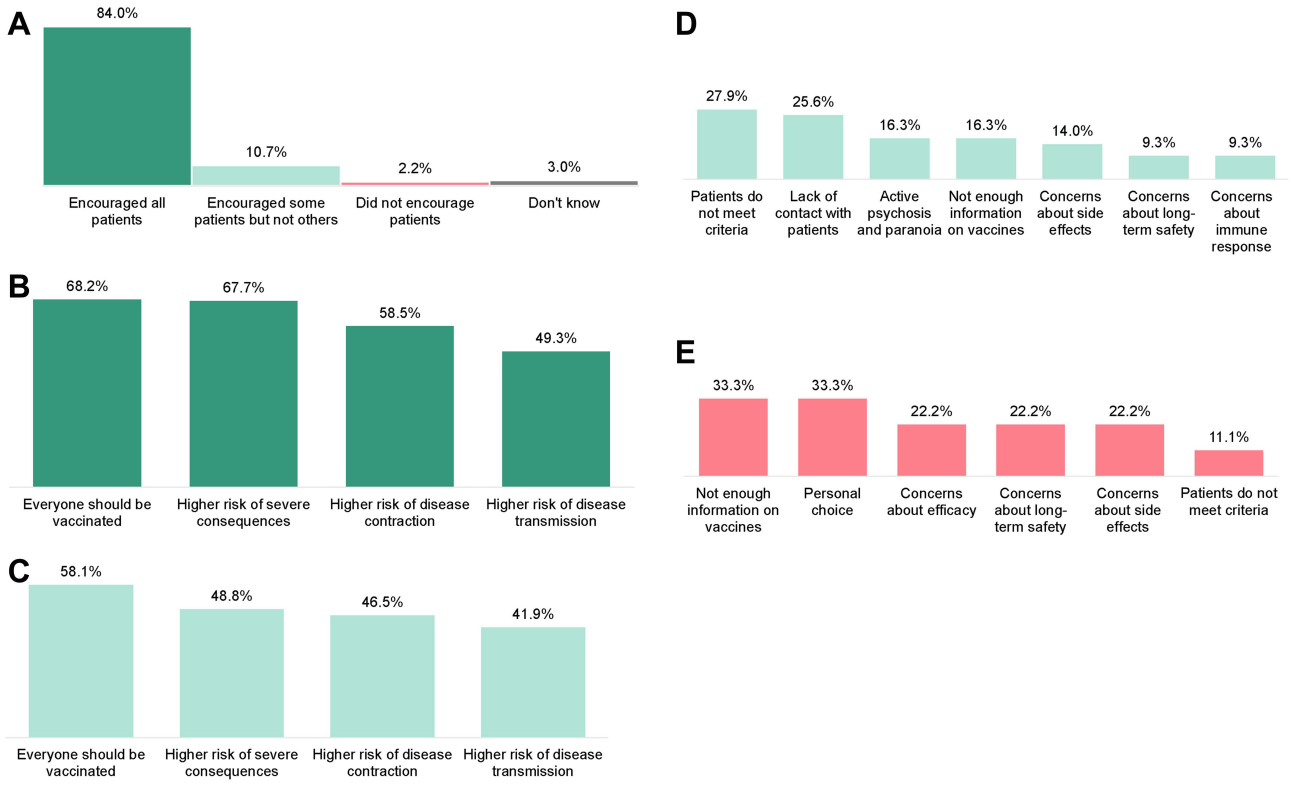

Figure 7 Attitudes of HCPs towards encouraging patients with schizophrenia to be vaccinated against COVID-19. (**A**) Have you encouraged your patients with schizophrenia to be vaccinated against COVID-19? (N=401) (**B**) Reasons for encouraging all patients to be vaccinated against COVID-19 (n=337). (**C**) Reasons for encouraging some patients to be vaccinated against COVID-19 (n=43). (**D**) Reasons for not encouraging some patients to be vaccinated against COVID-19 (n=43). (**E**) Reasons for not encouraging all patients to be vaccinated against COVID-19 (n=9).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional.

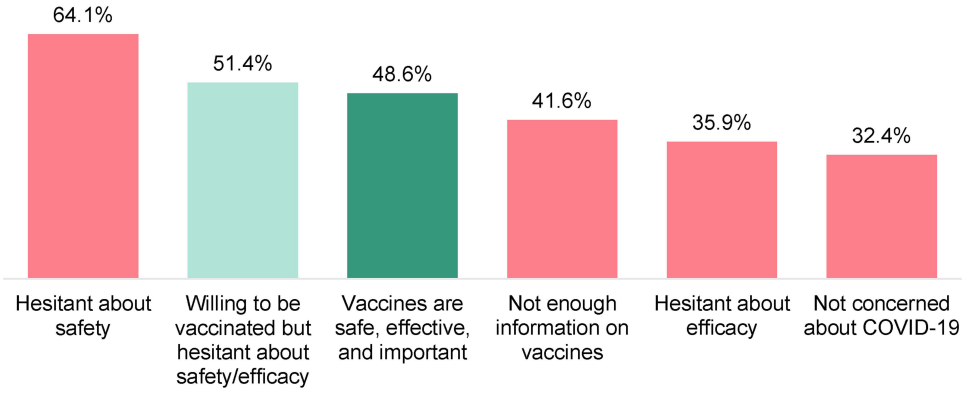

Figure 8 Attitudes of patients with schizophrenia towards COVID-19 vaccines, according to HCPs (N=401).
Abbreviations: COVID-19, coronavirus disease of 2019; HCP, healthcare professional.

Half of LAI prescribers reported that antipsychotic adherence stayed the same in the majority of patients, and close to a half reported that symptom control stayed the same; however, it is worth noting that more respondents reported their patients deteriorated during the COVID-19 pandemic than improved. The LAI prescribers listed a variety of reasons for the deterioration in antipsychotic adherence and symptom control, including patients' social isolation. These results suggest that the COVID-19 pandemic may impact patient outcomes by disrupting patients' support systems, as well as healthcare provisions, with potential increase in risks of mortality and morbidity.

In this study, the majority of the LAI prescribers used telehealth. As reported by the surveyed LAI prescribers, telehealth has potential advantages to promote antipsychotic adherence and symptom control among patients with schizophrenia via maintaining more convenient contact, enabling continuous monitoring between injections, and helping to understand patients' living conditions and treatment needs. The positive impacts of telehealth among patients with severe mental illness on treatment adherence, symptom control, and reduced hospitalizations have been suggested in previous studies.[39–41] However, prior research also reported that the lack of face-to-face interactions in telehealth may impact the ability to build therapeutic relationships, conduct nuanced assessments, or identify deteriorating mental health.[42] In addition, over half of the LAI prescribers in this study reported experiencing challenges maintaining contact with patients via telehealth due to patients' lack of access to technology.

The APA's guidance as well as multiple articles has suggested that patients with schizophrenia and other severe mental illness face unique challenges during the COVID-19 pandemic.[19,20,43–45] These issues include higher risks of contracting COVID-19 and serious complications, lower socioeconomic status limiting access to care, unstable access to or knowledge of pandemic resources, susceptibility to misinformation, and mistrust in healthcare systems.[19,20,43–45] The consequences of vaccine hesitancy are greater among patients with severe mental illness, and historically, the access to preventative care and uptake of vaccines such as the influenza vaccine can be as low as 25% for these patients.[44,46] Thus, the involvement of HCPs they trust and have established a treatment relationship with may be imperative for the timely vaccination of this patient population. Most of the LAI prescribers surveyed in this study believed that patients with schizophrenia needed to be prioritized for COVID-19 vaccination and encouraged their patients to become vaccinated, which aligns with the recently published APA recommendation supporting the equitable distribution of the COVID-19 vaccine among patients with serious mental illness by actively engaging with patients/caregivers and disseminating accurate information on vaccination.[44] However, most LAI prescribers reported that at least some patients were hesitant about the vaccine safety and/or efficacy, which may be in line with the general trends of vaccine hesitancy in the US overall population (as high as 66.8%[47]). Therefore, focused strategies are needed to support patients with schizophrenia at risk of remaining unvaccinated to overcome vaccine hesitancy and prevent a severe course of illness.

This study benefits from several important strengths, including unique and recent data from a large sample of US-based LAI prescribers on their perceptions of the impact of the COVID-19 pandemic on LAI prescribing habits and outcomes of patients with schizophrenia. The survey design permitted the collection of data that are not available in secondary data sources (such as electronic medical records and claims databases). Additionally, this study is timely given the importance of understanding current disruptions in health care during the pandemic, particularly among vulnerable patient populations with critical needs for treatment maintenance like those with schizophrenia. The results may also have a broader impact on understanding the attitudes toward COVID-19 vaccination among HCPs (specifically, LAI prescribers in this study) and their perceptions of the degree of vaccine hesitancy among patients with severe mental illness.

The results of this study should be considered in the light of several limitations, some of which are inherent to survey studies. First, the data collected in this study were self-reported by the participating LAI prescribers and may be subject to recall bias. Furthermore, patients' attitudes on COVID-19 vaccination were recalled and reported by the participating LAI prescribers, therefore may not fully represent the opinions of patients themselves. In addition, although attempts were made to minimize selection bias (eg, enrolling a relatively large number of participants from a nationwide panel), there remained a potential for bias since a LAI prescriber's decision be on a panel and to contribute time to the survey was not random. While three vaccines had been approved for use at the time of the survey, availability and prioritization of patient populations varied greatly by geographic area. Additionally, most participating LAI prescribers practiced in urban geographical settings, which may limit the generalizability of the results to rural settings. Lastly, the timing of the survey largely pre-dated the propagation of the Delta variant of the COVID-19 virus as the dominant variant in the US, which may have resulted in additional changes in patients' and LAI prescribers' attitudes towards vaccination.

Conclusions

The results of this survey study contextualize the unique challenges that LAI prescribers and patients with schizophrenia have encountered during the COVID-19 pandemic and provide encouraging insights into the maintenance of LAI treatments and alignment of clinical practice with US treatment guidelines. During the COVID-19 pandemic, LAI prescription habits and LAI prescribers' perceptions of their patients' adherence to therapy were largely unchanged. Additionally, despite patients' perceived vaccine hesitancy, the vast majority of LAI prescribers encouraged vaccination for COVID-19. Focused efforts to minimize barriers to and delays in COVID-19 vaccination of patients with schizophrenia, as well as to sustain the critical link between HCPs and patients for the maintenance of antipsychotic treatment, are recommended.

Abbreviations

APA, American Psychiatric Association; COVID-19, coronavirus disease of 2019; HCP, healthcare provider; LAI, long-acting injectable antipsychotics; OAP, oral antipsychotics; US, United States.

Data Sharing Statement

Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available. Therefore, restrictions apply to the availability of these data, which are not publicly available.

Ethics Approval and Informed Consent

Study participants provided their informed consent prior to responding to the survey questions. All study materials were reviewed by the WIRB-Copernicus Group Independent Review Board, and the study was granted an exemption determination per Title 45 of CFR, Part 46.104(d)(2) as no personally identifiable information was collected.

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Author Contributions

All authors have made significant contributions to the conception or design of the study, or the acquisition, analysis, or interpretation of data, drafting the manuscript and revising it critically for important intellectual content, have provided final approval of this version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

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