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Comparison of Healthcare Utilization Between Telemedicine and Standard Care: A Propensity-Score Matched Cohort Study Among Individuals With Chronic Psychotic Disorders in Ontario, Canada

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Background: **Telemedicine adoption has grown significantly due to the coronavirus of 2019 pandemic; however, it remains unclear what the impact of widespread telemedicine use is on healthcare utilization among individuals with psychosis.** ***Objectives:*** **To investigate the impact of telemedicine use on changes in healthcare utilization among patients with chronic psychotic disorders (CPDs).** ***Study Design:*** **We conducted a population-based, retrospective propensity-matched cohort study using healthcare administrative data in Ontario, Canada. Patients were included if they had at least one ambulatory visit between March 14, 2020 and September 30, 2020 and a CPD diagnosis any time before March 14, 2020. Telemedicine users (2+ virtual visits after March 14, 2020) were propensity score-matched 1:1 with standard care users (minimum of 1 in-person or virtual ambulatory visit and maximum of 1 virtual visit after March 14, 2020) based on several baseline characteristics. Monthly use of various healthcare services was compared between the two groups from 12 months before to 3 months after their index in-person or virtual ambulatory visit after March 14, 2020 using generalized estimating equations (eg, hospitalizations, emergency department [ED] visits, and outpatient physician visits). The slope of change over the study period (ie, rate ratio) as well as a ratio of slopes, were calculated for both telemedicine and standard care groups for each outcome.** ***Study Results:*** **A total of 18 333 pairs of telemedicine and standard care patients were identified after matching (60.8% male, mean [SD] age 45.4 [16.3] years). There was a significantly greater decline across time in the telemedicine group compared to the standard care group for ED visits due to any psychiatric conditions (ratio of slopes for telemedicine vs standard care (95% CI), 0.98 (0.98 to 0.99)). However, declines in primary care visit rates (ratio of slopes for telemedicine vs standard care (1.01 (1.01 to 1.02)), mental health outpatient visits with primary care (1.03 (1.03 to 1.04)), and all-cause outpatient visits with primary care (1.01 (1.01 to 1.02)), were steeper among the standard care group than telemedicine group.** ***Conclusions:*** **Overall, patients with CPDs appeared to benefit from telemedicine as evidenced by increased outpatient healthcare utilization and reductions in ED visits due to psychiatric conditions. This suggests that telemedicine may have allowed this patient group to have better access and continuity of care during the initial waves of the pandemic.**

Key words: Psychotic Disorders/Schizophrenia/Ontario/Virtual Care/Propensity Score

Introduction

The coronavirus of 2019 (COVID-19) pandemic has transformed the delivery of all healthcare, including psychiatric care.[1] To accommodate social distancing mandates in Ontario, throughout the pandemic, the Ministry of Health quickly approved billing codes that allowed any type of technology (telephone calls and videoconferencing software) to be used for telemedicine.[2,3] In response, in-person medical services were quickly transitioned to virtual visits. In psychiatry, assessment is often based on interviews and observations, and most treatments can be delivered without physical patient contact, making psychiatric practice readily adaptable to telemedicine.[4–6]

Before the pandemic, there was already a large expansion of telemedicine underway, for example in Ontario, Canada the total number of psychiatrists delivering telepsychiatry increased 3-fold from 2008 to 2012.[7] However, most of this telemedicine was delivered from urban psychiatrists to remote primary care offices. The advent of the pandemic has increased the level of direct-to-patient virtual visit opportunities in psychiatry, which has likely been highly appropriate for large swaths of the population, especially given the growing evidence of efficacy for virtually delivered psychotherapy–as well as psychiatric care—for mood and anxiety disorders.[8,9]

Chronic psychotic disorders (CPDs) such as schizophrenia and schizoaffective disorder affect about 1% of the population and are severe and disabling for many of those affected.[10] Poor psychiatric and medical outcomes in this population include lack of self-care that can lead to worse health outcomes and higher mortality rates.[10–12] Studies have shown that poor access to timely and effective health care resources partly explains the poor outcomes in patients with CPDs.[13–16] The annual mean number of patient contacts with their primary care provider is estimated to be 3.9 visits per patient living with CPD.[17] With COVID-19 and its containment efforts, there has been concern about whether problems with access to healthcare would be exacerbated in this population, or whether some individuals with CPDs would use, and benefit from, telemedicine opportunities, such as comprehensive psychiatric care that may include case management, and psychological and psychiatric treatment to optimize outcomes including symptom remission and psychosocial recovery. However, studies of telemedicine in this population have mainly been focused on adding virtual options such as text message or telephone reminders for appointment or medication adherence, and not on medical or psychiatric care conducted virtually.[18–20]

The goal of this study was to quantify the use of outpatient telemedicine among all individuals with CPDs in Ontario (Canada's largest province population: ~14.6 million) during the initial waves of the COVID-19 pandemic, and to examine the association between outpatient telemedicine use and acute healthcare utilization (ie, hospitalizations, emergency department [ED] visits, psychiatry visits, and primary care visits) in this population.

Methods

Study Design and Data Sources

This population-based, retrospective cohort study of patients living with CPDs used administrative claims data from Ontario, Canada. The following databases were used: (1) Ontario Health Insurance Plan (OHIP), which includes information on all health services delivered by physicians to Ontario patients who are eligible for coverage; (2) Discharge Abstract Database (DAD), which records all inpatient hospital admissions; (3) National Ambulatory Care Reporting System, which contains data on all hospital- and community-based ambulatory care (including ED visits); (4) Registered Persons Database, which contains demographic information of all patients covered under OHIP; and (5) Ontario Mental Health Reporting System (OMHRS) database, which provides data on patients in adult designated inpatient mental health beds, including beds in general, provincial psychiatric and specialty psychiatric facilities. The Postal Code Conversion File was used to convert all patient postal codes to neighborhood income quintiles. Several databases were linked using unique encoded identifiers and analyzed at ICES, an independent, nonprofit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze health care and demographic data, without consent, for health system evaluation and improvement.

Study Cohort

Individuals with CPDs were identified using a validated algorithm,[21] defined as meeting any of the following diagnostic codes within the 3 years before March 14th, 2020: (1) had at least one hospital admission (DAD with International Classification of Disease—10th Revision codes F20, F25, or F29 or OMHRS database with Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) codes 295 or 298 listed as the most responsible diagnosis; and/or (2) had at least three physician claims (OHIP database) with DSM-IV codes 295, 297, 298, or fee code listed as Q021. March 14, 2020 was chosen as the start date of the observation window as that was the date that new temporary billing codes were introduced by the Ontario government that expanded physician reimbursement of telemedicine services in response to the COVID-19 pandemic, and September 30, 2020 was the end date of the observation window (Supplementary Table A1).[22]

We then stratified the cohort of patients with CPDs into two groups: a telemedicine group, defined as patients who had at least two telemedicine visits in the observation window (March 14, 2020 to September 30, 2020); and a standard care group, defined as patients who had no more than one telemedicine visit but did have at least one ambulatory visit (in-person or virtual) within the observation window. The index visit for each patient is their first telemedicine visit (or first in-person visit for those with zero telemedicine visits during the observation window). Please see Supplementary Table A2 for codes used to define telemedicine claims. We excluded patients who were not Ontario residents or had an invalid or missing health card number.

Table 1. Baseline Characteristics of Patients Who Were Telemedicine Users[a] Vs Standard Care Users[b] Before and After Propensity-Score Matching (With Standardized Differences)

Characteristic	Before Propensity Score Matching, No. (%)			After Propensity Score Matching, No. (%)		
	Telemedicine[1] *N* = 31 149	Standard Care[2] *N*= 20 797	Standardized Difference	Telemedicine [1] *N* = 18 333	Standard Care[2] *N* = 18 333	Standardized Difference
Demographic information						
Age, mean (SD)	44.1 (16.4)	46.1 (16.6)	0.12	45.4 (16.4)	45.4 (16.3)	0
Age group—*n* (%)						
40–59	24 983 (80.2%)	16 008 (77.0%)	0.08	14 364 (78.4%)	14 338 (78.2%)	0
60–69	4050 (13.0%)	2 957 (14.2%)	0.04	2543 (13.9%)	2565 (14.0%)	0
70–79	1634 (5.2%)	1305 (6.3%)	0.04	1072 (5.8%)	1074 (5.9%)	0
80–89	414 (1.3%)	432 (2.1%)	0.06	306 (1.7%)	309 (1.7%)	0
90+	68 (0.2%)	95 (0.5%)	0.04	48 (0.3%)	47 (0.3%)	0
Sex—*n* (%)						
Female	13 978 (44.9%)	7893 (38.0%)	0.14	7179 (39.2%)	7179 (39.2%)	0
Male	17 171 (55.1%)	12 904 (62.0%)	0.14	11 154 (60.8%)	11 154 (60.8%)	0
Income quintile—*n* (%)						
1 (lowest)	10 650 (34.2%)	7988 (38.4%)	0.09	6901 (37.6%)	6930 (37.8%)	0
2	6640 (21.3%)	4472 (21.5%)	0	3956 (21.6%)	3973 (21.7%)	0
3	5424 (17.4%)	3364 (16.2%)	0.03	3030 (16.5%)	3006 (16.4%)	0
4	4280 (13.7%)	2433 (11.7%)	0.06	2229 (12.2%)	2223 (12.1%)	0
5 (highest)	3967 (12.7%)	2237 (10.8%)	0.06	2052 (11.2%)	2033 (11.1%)	0
Missing	188 (0.6%)	303 (1.5%)	0.08	165 (0.9%)	168 (0.9%)	0
Level of rurality (Rurality Index of Ontario score)—*n* (%)						
Urban	29 529 (94.8%)	19 155 (92.1%)	0.11	17 123 (93.4%)	17 119 (93.4%)	0
Rural	1295 (4.2%)	1152 (5.5%)	0.06	929 (5.1%)	937 (5.1%)	0
Missing	325 (1.0%)	490 (2.4%)	0.1	281 (1.5%)	277 (1.5%)	0
Charlson Comorbidity Index categories —*n* (%)						
0	28 789 (92.4%)	18 887 (90.8%)	0.06	16 767 (91.5%)	16 762 (91.4%)	0
1	1138 (3.7%)	912 (4.4%)	0.04	751 (4.1%)	758 (4.1%)	0
2+	1222 (3.9%)	998 (4.8%)	0.04	815 (4.4%)	813 (4.4%)	0
Healthcare utilization						
Number of hospitalizations due to any psychiatric illness in the past 3 months—*n* (%)						
0	27 688 (88.9%)	19 145 (92.1%)	0.11	16 823 (91.8%)	16 823 (91.8%)	0
1	3461 (11.1%)	1652 (7.9%)	0.11	1510 (8.2%)	1510 (8.2%)	0
Number of hospitalizations due to any psychiatric illness in the past 2 years—*n* (%)						
0	18 398 (59.1%)	13 435 (64.6%)	0.11	11 778 (64.2%)	11 397 (62.2%)	0.04
1	12 751 (40.9%)	7362 (35.4%)	0.11	6555 (35.8%)	6936 (37.8%)	0.04
Number of ED visits due to any psychiatric conditions in the past 2 years—*n* (%)						
0	17 240 (55.3%)	12 615 (60.7%)	0.11	10 738 (58.6%)	10 762 (58.7%)	0
1	13 909 (44.7%)	8182 (39.3%)	0.11	7595 (41.4%)	7571 (41.3%)	0

Table 1. Continued

Characteristic	Before Propensity Score Matching, No. (%)			After Propensity Score Matching, No. (%)		
	Telemedicine[1] *N* = 31 149	Standard Care[2] *N*= 20 797	Standardized Difference	Telemedicine [1] *N* = 18 333	Standard Care[2] *N* = 18 333	Standardized Difference
Number of all-cause hospitalizations in the past 2 years—*n* (%)						
0	25 385 (81.5%)	16 844 (81.0%)	0.01	14 913 (81.3%)	14 945 (81.5%)	0
1	5764 (18.5%)	3953 (19.0%)	0.01	3420 (18.7%)	3388 (18.5%)	0
Any hospitalization for substance abuse and disorders in the past 2 years—*n* (%)						
0	29 196 (93.7%)	19 220 (92.4%)	0.05	16 913 (92.3%)	16 969 (92.6%)	0.01
1	1953 (6.3%)	1577 (7.6%)	0.05	1420 (7.7%)	1364 (7.4%)	0.01
Number of all-cause outpatient visits with primary care provider in the past 2 years—mean (SD)	23.8 (28.4)	21.8 (27.7)	0.07	22.4 (27.5)	22.3 (28.0)	0
Number of mental health outpatient visits in the past 2 years—mean (SD)	31.6 (38.6)	24.1 (36.7)	0.2	26.5 (36.9)	26.1 (37.4)	0.01
Any usual psychiatrist provider in the past 2 years—*n* (%)						
0	10 248 (32.9%)	9654 (46.4%)	0.28	7444 (40.6%)	7553 (41.2%)	0.01
1	20 901 (67.1%)	11 143 (53.6%)	0.28	10 889 (59.4%)	10 780 (58.8%)	0.01
Any usual primary care provider in the past 2 years—*n* (%)						
0	13 326 (42.8%)	9098 (43.7%)	0.02	8043 (43.9%)	8009 (43.7%)	0
1	17 823 (57.2%)	11 699 (56.3%)	0.02	10 290 (56.1%)	10 324 (56.3%)	0

Note: ED, emergency department.
[a]Patients who had at least two mental health visits that were virtual visits in the observation window.
[b]Patients who had no more than one mental health virtual visit but did have at least one mental health ambulatory or one mental health virtual visit in the observation window.

Table 2. Coefficient Estimates From GEE Model

Outcome	Slope for Telemedicine Group[a] (95% CI)	Slope for Standard Care Group[b] (95% CI)	Ratio of Slopes[c] (95% CI)
Number of hospitalizations due to chronic psychotic disorder	0.9893 (0.9816 to 0.9971)	0.9848 (0.9780 to 0.9916)	1.01 (0.99 to 1.02)
Number of hospitalizations due to any psychiatric illness	0.9796 (0.9741 to 0.9852)	0.9796 (0.9742 to 0.9851)	1.00 (0.99 to 1.01)
Number of emergency department visits due to any psychiatric conditions	0.9838 (0.9781 to 0.9897)	0.9941 (0.9884 to 0.999)	0.99 (0.98 to 0.99)
Number of outpatient psychiatry visits with any psychiatrist	0.9981 (0.9946 to 1.0015)	0.9847 (0.9808 to 0.9886)	1.01 (1.01 to 1.02)
Number of mental health outpatient visits with primary care	1.0215 (1.0185 to 1.0245)	0.9870 (0.9843 to 0.9897)	1.04 (1.03 to 1.04)
Number of all-cause outpatient visits with primary care	1.0048 (1.0026 to 1.0071)	0.9935 (0.9912 to 0.9958)	1.01 (1.01 to 1.02)

Note: ED, emergency department; GEE, generalized estimating equation.
[a]Patients who had at least two mental health visits that were virtual visits in the observation window.
[b]Patients who had no more than one mental health virtual visit but did have at least one mental health ambulatory or one mental health virtual visit in the observation window.
[c]Ratio of slopes: defined as slope for telemedicine group divided by slope for standard care group.

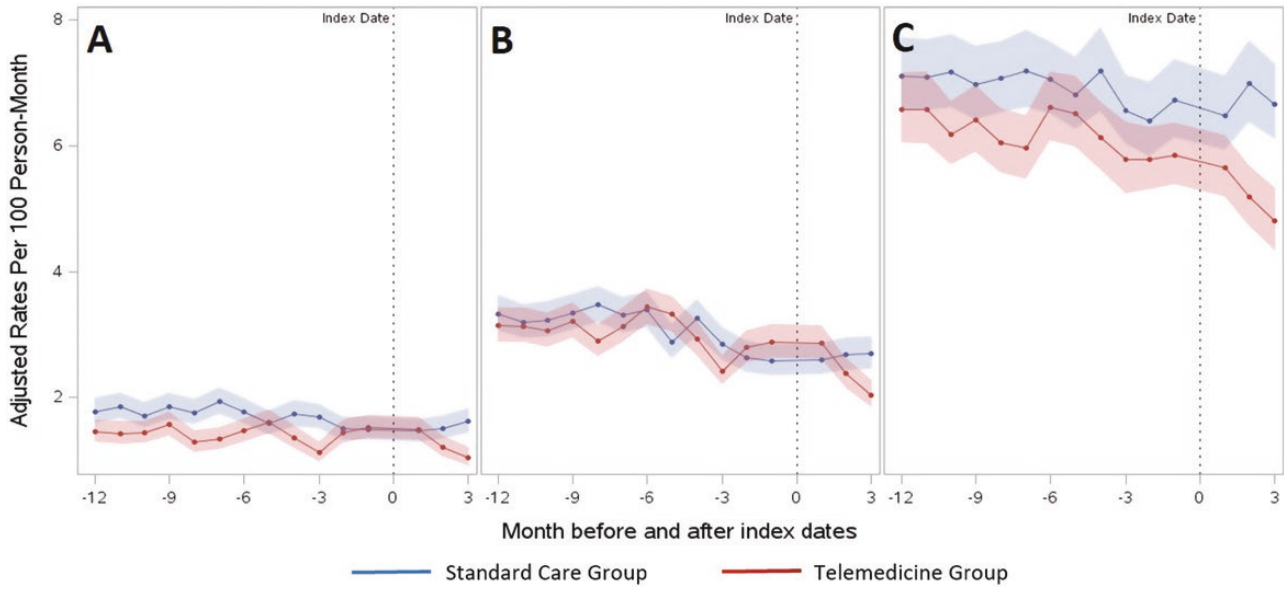

Fig. 1. Hospitalization/ED visits (adjusted rates per 100 person-month) across time by patients who were in the telemedicine group (at least two mental health virtual visits) vs the standard care group (no more than one mental health virtual visit). Outcomes listed include: (A) Number of hospitalizations due to chronic psychotic disorder; (B) Number of hospitalizations due to any psychiatric illness; and (C) Number of ED visits due to any psychiatric conditions. ED, emergency department.

Propensity Score

To ensure comparability between the telemedicine and standard care groups, we calculated a propensity score for each patient to represent their probability of receiving telemedicine.[23,24]

Individuals from the telemedicine group and the standard care group were then matched 1:1 based on their propensity scores using greedy matching algorithms within ± 0.2 SD.[25,26] We randomly assigned each individual in the standard care group an index date to match the distribution of the telemedicine group index dates. Furthermore, we exact (hard) matched on several key variables: age, sex, number of hospitalizations due to any psychiatric illness in the 3 months before the index date, and group of number of hospitalizations due to any psychiatric illness in the 3 months prior. To ensure that matching was successful, the distribution of characteristics in both groups was then compared,

and standardized differences greater than 0.1 were considered imbalanced.[27] The following covariates were incorporated into the model that was used to generate individual propensity scores: income quintile, rural residence (<10 000 inhabitants), ED visits due to any psychiatric conditions in the 2 years before the index date, Charlson Comorbidity Index in the 3 years before index, number of all-cause hospitalizations in the 2 years before index, number of mental health outpatient visits (with psychiatry and primary care) in the 2 years before index, number of all-cause outpatient visits with primary care provider in the 2 years before the index date, diagnosis of substance abuse disorder on hospital admission in the 2 years before index, and evidence of usual care provider (usual psychiatrist provider and usual primary care provider) in the 2 years before index (codes defined in Supplementary Table A2).

Outcomes

We assessed specific healthcare utilization outcomes monthly, 12 months before index date and over the 90-day period post-index date. In regard to ED visits and hospitalizations (ie, outcomes that we want to prevent), we examined the number of hospitalizations for CPDs (schizophrenia, schizoaffective disorder, psychotic disorder, Not Otherwise Specified), number of hospitalizations due to any psychiatric illness, and number of ED visits due to any psychiatric conditions. In regard to outpatient visits (ie, outcomes that we want to encourage in this population), we examined the number of outpatient psychiatry visits with psychiatrist, number of mental health outpatient visits with primary care, and number of all-cause outpatient visits with primary care.

Statistical Analysis

We developed a generalized estimating equation (GEE) model for each outcome based on the independent variables time, exposure group, and the interaction of time*group. We accounted for correlation due to matching as the GEE could only incorporate one level of clustering. An exchangeable correlation structure was used. Rate ratios, also known as the slope of change over the 15-month period, were calculated for both telemedicine and standard care groups for each outcome. A rate ratio, or slope, >1 implies that there was a general increase in utilization over time for that group. A ratio of the slopes, defined as the slope for the telemedicine group divided by the slope for the standard care group, was also calculated to compare whether the rate of change over time significantly differed between groups. A ratio of slopes >1 implies that there was higher use over time in the telemedicine group compared to the standard care group. All analyses were performed in SAS 9.4 (SAS Institute).

Ethics Approval

Use of these databases for the purposes of this study was authorized under §45 of Ontario's Personal Health Information Protection Act, which does not require review by a research ethics board.

Results

Patient Characteristics

Before matching, we identified 31 149 patients in the telemedicine group and 20 797 patients in the standard care group within the CPD population (Table 1). After 1-to-1 propensity score matching, 18 333 pairs of telemedicine/standard care users were included in the study cohort. The distribution of baseline patient characteristics in the telemedicine versus standard care group after matching is illustrated in Table 1 (60.8% were male; mean [SD] age was 45.4 [16.3] years). All baseline characteristics were well balanced between the two groups, as demonstrated by standardized differences of <0.10 for all measured baseline characteristics. In general, after matching, 37.6% of patients in the matched cohort were listed in the lowest income quantile, 35%–40% had hospitalizations and/or ED visits due to any psychiatric illness in the past 2 years, and 4.4% had a Charlson Comorbidity Index of two or more.

Hospitalizations and ED Visits

Figure 1 illustrates the adjusted rates of hospitalizations and ED visits across time in both the telemedicine and standard care groups. Both groups saw a statistically significant decline from the 12-month period before their index visit (defined as their first in-person or virtual ambulatory visit during the pandemic) to 3 months post-index date for hospital admissions due to CPD (average monthly decrease in standard care group: −0.4%; telemedicine group: −1.4%) or any psychiatric illness (standard care group: −1.2%; telemedicine group: −2.5%) or ED visits due to any psychiatric conditions (standard care group: −0.4%; telemedicine group: −2.1%). The rate ratio (slope) and ratio of slope estimates from the GEE model are reported in Table 2. The ratio of the slopes (defined as slope for telemedicine group divided by slope for the standard care group) indicates that there was a steeper decline in the telemedicine group compared to standard care group for ED visits due to any psychiatric conditions (Rate Ratio [RR] (95% CI), 0.98 (0.98 to 0.99)). However, no significant declines were observed between the two groups for hospitalizations due to CPD (1.0 (0.99 to 1.1)) and hospitalizations due to any psychiatric illness (1.0 (0.99 to 1.1)).

Outpatient Physician Visits

Figure 2 shows the trends in physician visit rates for telemedicine and standard care groups. The standard care

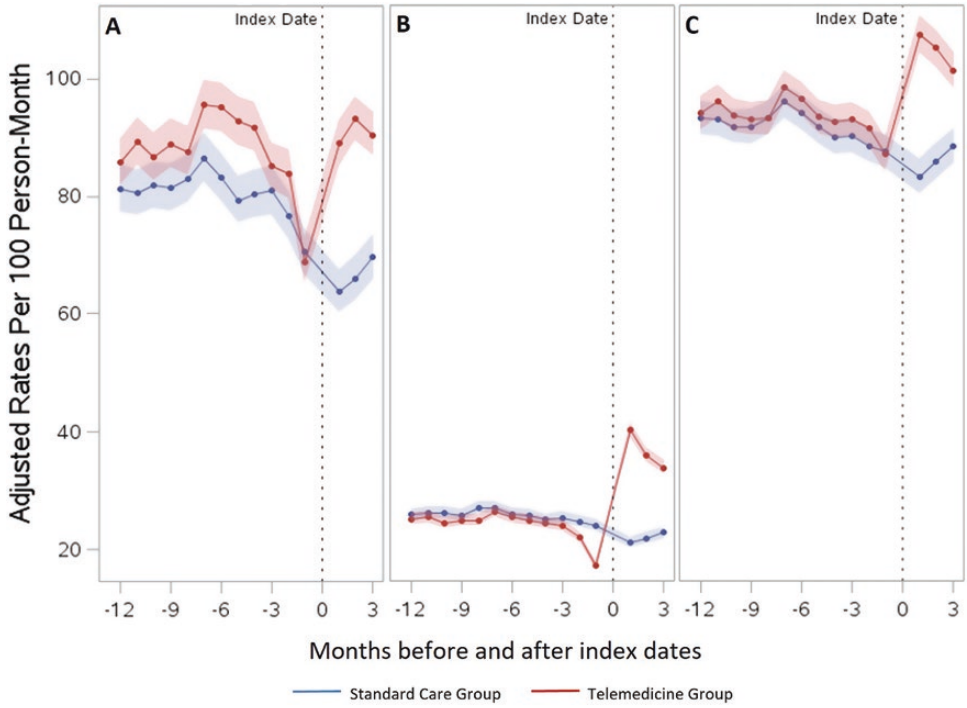

Fig. 2. Outpatient visits (adjusted rates per 100 person-month) across time by patients who were in the telemedicine group (at least two mental health virtual visits) vs the standard care (no more than one mental health virtual visit). Outcomes listed include: (A) Number of outpatient psychiatry visits with a psychiatrist; (B) Number of mental health outpatient visits with primary care; and (C) Number of all-cause outpatient visits with primary care.

group experienced a statistically significant decline in outpatient psychiatry visits with a psychiatrist (average monthly decrease of −1.0%), mental health outpatient visits with primary care (−0.8%), and all-cause outpatient visits with primary care (−0.3%) during the period of 12 months before to 3 months after their index visit. Conversely, the telemedicine group experienced a statistically significant increase in mental health outpatient visits with primary care (+6.0%) and all-cause outpatient visits with primary care (+0.7%), but no significant increase for outpatient psychiatry visits with a psychiatrist, during the period 12 months before to 3 months after their index visit. When comparing the ratio of slopes of telemedicine vs standard care groups, there was a steeper decline among the standard care group than the telemedicine group in the rate of outpatient psychiatry visits with psychiatrist (RR (95% CI), 1.01 (1.01 to 1.02)), mental health outpatient visits with primary care (1.03 (1.03 to 1.04)), and all-cause outpatient visits with primary care (1.01 (1.01 to 1.02)) (**Table 2**).

Discussion

In this province-wide cohort study of patients living with CPD, we identified that the use of telemedicine, as compared with standard care, was associated with greater reductions in monthly rates of ED admissions over time and an increased monthly rate of outpatient psychiatry visits as well as mental health and all-cause outpatient visits with primary care. These findings have policy implications for how care should be delivered within this patient group going forward as planning of how telemedicine will fit into the future of healthcare after the pandemic. First, it appeared that telemedicine helped to fill the gap in accessing care for this at-risk population during the pandemic. Second, telemedicine presents an opportunity to maintain the continuity of care for high-need patients, such as patients living with CPD, by allowing them to receive outpatient medical care (psychiatrist and primary care) readily.

Since the onset of the COVID-19 pandemic, mandates regarding telemedicine provision have changed in most countries.[28–30] Many jurisdictions, including Ontario, Canada, initiated temporary restrictions for in-person healthcare to prevent overwhelming the healthcare system and to reduce the risk of viral transmission. To help substitute face-to-face care, telehealth was rapidly adopted, with remote video or phone conferencing being provided.[22,31] This rapid change in care management was of special concern among patients living with CPD, a population at risk of severe adverse outcomes if there are gaps in care.[32] There is already some evidence of short-term success of telepsychiatry during the pandemic among populations with depression and anxiety,[33,34] but there are a limited number of studies on the effectiveness of telemedicine among patients living with CPDs, making it difficult to provide the evidence needed to justify such programs among this population. Our study helps to fill this gap in evidence by illustrating that, among patients

living with CPD, telemedicine users increased their outpatient use and decreased their ED admissions due to any psychiatric conditions, which perhaps suggests that there was improved access to care virtually, which was associated with a reduction in emergency/acute admissions in this patient population.

It may have been assumed that individuals with CPDs would not be able to be well-connected with telemedicine due to the positive symptoms, negative symptoms, and cognitive symptoms associated with their illnesses.[20] However, our study showed that many remained connected, and that connection may have even increased their connection with the care and possibly reduced ED visits. As such, this study's implications are that telemedicine appears to be quite feasible, at least in a subset of this population, and raises the question of whether telepsychiatry should routinely be offered as an option for this population moving forward. Further, the ability to connect with psychiatric services from anywhere may impact patient engagement and reduce barriers to appointments. For example, primary quality improvement data had suggested that no-show rates have decreased by 20% between the immediate pre-COVID period (January and February 2020) and the COVID period (April and May 2020), likely due to decreased logistical barriers to access.[35,36] Lastly, results from this study have shown that telemedicine access can fill a critical gap in the delivery of care for patients living with CPD. Providing continuity of care virtually appeared to help this population to continue to receive crucial health services. This is evidenced by the telemedicine group in our cohort having increased access to outpatient services and decreased ED visits (which outpatient care aims to do). Thus, it demonstrates the potential effectiveness of patient-centered telemedicine delivery for this population. Future studies should continue to monitor the long-term effectiveness of telemedicine post-COVID-19 and the barriers/facilitators to improve the delivery of care for patients living with CPDs and who are accessing care virtually. In addition, studies should aim to understand what factors serve as predictors of which CPD patients become telemedicine users versus standard care users to develop targeted approaches to improve overall access to care. For example, for telemedicine to be sustainable among this population, we need to ensure that individuals have ways to access care virtually (ie, providing phones with plans, computers, etc.). There should not be an added cost to a population where many people are living below the poverty line, as evidenced by 37.6% of patients in the matched cohort being listed in the lowest income quantile.

There are limitations in our study design that warrant discussion. First, all analyses included are based on health administrative data, and as such, the data lacks clinical detail outside the billing and diagnostic codes associated with the visit. Second, the data analyzed are relatively recent. Physicians have 6 months to bill for the services they provide, therefore more recent data may not be available yet. Third, the new temporary telemedicine billing codes initiated at the onset of the COVID-19 pandemic do not distinguish for modality that was used by physicians who billed the temporary codes (ie, phone vs video). Fourth, the short period of time covered by the analyses (less than a year) does not allow us to evaluate the long-term effects and outcomes of telemedicine use among this population. In addition, given that the observation window is so narrow, only the patients with more unstable illnesses may have been seen by their physicians two or more times, whereas stable patients (for whom visits may be scheduled every 3 months or less) might disproportionately fall into the standard care group. This may favor the telemedicine population in our study to have higher healthcare utilization over time compared to the standard care population. However, we believe the variables that we matched in our propensity score matching analysis is predictive of disease severity and minimize such confounding. Fifth, among those living with CPDs, there is heterogeneity.[37] Further work is needed to know if there are specific subgroups who benefited and did not benefit from telemedicine. Finally, our study was conducted in the context of a pandemic, and it is difficult to forecast telemedicine utilization and patient outcomes under more normal circumstances. Telemedicine policies may shift in the future with new rules and regulations, thus similar evaluations should be updated, and continuous monitoring of this high-risk population is needed.

Conclusion

In this large population-based propensity-matched cohort of patients living with CPDs, we identified that telemedicine patients had higher outpatient healthcare utilization over time compared to standard care. As telemedicine becomes more widespread and may become a more common form of care delivery in psychiatry and/or among this patient population, future research is needed to examine the long-term impact of telemedicine use, assess the quality of care offered via telemedicine, and identify predictors of those who access telemedicine versus those who do not.

Supplementary Material

Supplementary data are available at *Schizophrenia Bulletin Open* online.

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