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Examination of the impact of COVID-19 public health quarantine measures on acute mental health care services: A retrospective observational study

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ABSTRACT

This study assesses for the impact of Covid-19 public health quarantine measures on acute care psychiatric admissions, by comparing admission data from the quarantine period to a comparator period. A chart review was conducted for all admissions to an urban acute care psychiatric centre from Mar 22 – June 5 2020 (quarantine) and January 5 – Mar 21 2020 (comparator). Data was collected on the number of admissions, demographics, patients' psychiatric history, characteristics of admissions, discharge information, patients' substance use and social factors. Data was analyzed using a student's t-test for continuous variables and Chi squared analyses for categorical variables. Results demonstrated 185 admissions during quarantine and 190 during the comparator, with no significant differences in the distribution of admissions across time periods. There was a significantly greater frequency of admissions in the 35-44 age bracket and admissions involving substance use during quarantine. Additionally, admissions during quarantine were significantly shorter, with increased frequency of involuntary status and use of seclusion. The data suggests a vulnerability specific to individuals in their 30-40s during quarantine and demonstrates a need to better understand factors impacting this group. It also suggests that quarantine is associated with changes to substance use, potentiating high acuity illness requiring admission.

1. Introduction

In 2020, Covid-19 posed a public health emergency resulting in widespread quarantine measures, however the current literature on the impacts of quarantine on mental health is small. Brooks et al conducted a rapid review of the literature on the psychological impacts of quarantine measures in prior pandemics (24 papers reviewed); results suggested an association between quarantine and symptoms of depression and post-traumatic stress disorder (Brooks et al., 2020). An observational study of university students, published in the early months of the Covid-19 pandemic, demonstrated increases in anxiety, depression, suicidal thoughts and intent (Kaparounaki et al., 2020). The current literature examines mental health outcomes predominantly in voluntary, community-based samples; less is understood about the interaction of quarantine measures with mental illness requiring inpatient admission.

There have been several case studies published describing individuals with no prior psychiatric history, who experienced a first episode of psychosis during quarantine and were outside the typical age

of onset range for psychosis (D'Agostino et al., 2021; Finatti et al., 2020; Huarcaya-Victoria et al., 2020; Shanbour et al., 2020; Valdés-Flórido et al., 2020). Hypotheses to explain this phenomenon include the stressors of social isolation and changes to daily routines, and/or increased substance use, in an individual with underlying vulnerability (Brown et al., 2020; D'Agostino et al., 2021; Di Forti et al., 2014; Valdés-Flórido et al., 2020). Esposito et al investigated this phenomenon in an observational study in Lombardy, Italy, comparing patients with first-episode psychosis during quarantine and a comparator period, and found increased age during quarantine. Authors posited that older individuals are more susceptible to illness precipitated by environmental factors, thus supporting the hypothesized mechanism of increased social stressors (Esposito et al., 2021). The other commonly cited potential mechanism is increased substance use during Covid-19 public health restrictions. Some online surveys assessing changes in substance use report increases in rates of alcohol and cigarette use (Pollard et al., 2020; Sun et al., 2020; Vanderbruggen et al., 2020), while others report decreases in alcohol use (Sallie et al., 2020; Wardell et al., 2020). A survey

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conducted by the Canadian Centre on Substance Abuse and Addiction reported that 18% of Canadians increased their alcohol use after restrictions were introduced (NANOS Research, 2020), and a repeated cross-sectional analysis of Canadian adults demonstrated that those who use cannabis increased their use during quarantine (Imtiaz et al., 2020). Multiple studies identified specific risk factors associated with increased substance use, including having children in the home and having symptoms of psychiatric illness (Sallie et al., 2020; Vanderbruggen et al., 2020; Wardell et al., 2020).

There is a need to understand the impact of Covid-19 public health restrictions on acute care admissions, to inform health promotion activities and health resource planning. In Nova Scotia, Canada, a State of Emergency was declared on March 22nd, 2020, requiring citizens to stay home except for essential outings. Mental health acute care inpatient services remained open during these restrictions. We present a detailed retrospective observational study comparing inpatient psychiatric admissions during the Covid-19 quarantine to an earlier comparator period, with goals of understanding differences in 1) the numbers of patients admitted, 2) the demographic profiles of those admitted and nature of their presentations, and 3) factors such as substance use that may potentiate illness during public health restrictions.

2. Methods

2.1. Ethics approval

All procedures were approved by the Nova Scotia Health Research Ethics Board.

2.2. Data collection

Data was collected for all patients admitted to inpatient acute care psychiatric services at the QEII Health Sciences Centre in Halifax, Nova Scotia. This is the primary acute care centre for the Nova Scotia Health Central Zone, which encompasses a population of 424037 (Statistics Canada, 2017). Data was collected during the 11-week quarantine period, from March 22 2020 – June 5 2020. This corresponds with the date that a State of Emergency was announced in Nova Scotia, to when restrictions began to be lifted. Data was also collected from an earlier 11-week comparator period, from January 5 2020 – March 21 2020.

2.3. Procedures

Electronic charts for all admissions during these two time periods were retrieved and subsequently reviewed by one assessor; this included review of admission documents, inpatient notes, and discharge summaries. Instances where records had unclear data were discussed by the study team. Data was recorded on a number of variables including: 1) Number of cases (total number of admissions, frequency of admissions per week); 2) Demographic data (age, gender); 3) Psychiatric history (prior diagnoses, whether it was an index admission, previous psychiatric admission within the past 6 months, existing mental health supports); 4) Admission characteristics (involuntary status, use of seclusion, length of admission); 5) Discharge information (discharge disposition, discharge diagnosis); 6) Patients' substance use (present use, history of substance misuse, changes in use associated with presentation to hospital); and 7) Patients' social supports, employment status, relationship status, housing.

2.4. Statistical analyses

Statistical analysis was conducted to assess for differences in the above variables between the two time periods. For continuous variables, a student's t-test was employed. For categorical variables, a Chi-squared test of independence was employed. The critical p-value was calculated using the Bonferroni correction when multiple Chi-squared analyses

were conducted on a given variable. Analysis was completed using Microsoft Excel Version 2016 Analysis ToolPak.

3. Results

3.1. Number of cases

There was a total of 375 admissions during the study period; there were 185 admissions during quarantine and 190 admissions during the comparator period. Analysis of the frequency of admissions per week demonstrated a significant difference at week 11 ($p=.021$); this did not hold after correction for multiple analyses (corrected p -value .005).

3.2. Demographics

There was no significant difference in patients' mean age at admission; mean age was 40.28 ($N=185$, $SD 13.90$) in quarantine versus 38.94 ($N=190$, $SD 16.09$) in the comparator. When age was divided into age brackets and analyzed as a categorical variable, a significant difference in the distribution across brackets was demonstrated ($X^2(5, N=375) =14.56, p=.012$). Analysis of each bracket individually demonstrated significance in ages 35-44, with more admissions during quarantine ($X^2(1, N=375) =8.21, p=.004$); this held after correction for multiple analyses (corrected p -value .008). There were no significant differences in patients' gender; the sample was 59% male and 41% female in quarantine ($N=185$), 54% male and 46% female in the comparator ($N=190$). Post-hoc analysis of the 35-44 age bracket also demonstrated no differences in gender. Patient demographic data is summarized in Table 1.

3.3. Psychiatric history

There were no significant differences observed in the frequency of patients with prior mental health diagnoses, connections to mental health services, previous admissions within the past 6 months, nor in the frequency of index admissions. Post-hoc analysis of the 35-44 age bracket demonstrated more index admissions during quarantine versus the comparator (14 versus 4); however, this did not demonstrate significance.

3.4. Admission characteristics

Length of hospitalization was significantly different between time periods, with mean length 11.53 days ($N=185$, $SD 15.94$) in quarantine versus 23.17 days ($N=189$, $SD 27.21$) in the comparator ($t(305) = -5.05, p<.001$). There was a significantly greater frequency of involuntary admissions ($X^2(1, N=368) =5.98, p=.014$) and use of seclusion ($X^2(1, N=358) =4.71, p=.030$) during quarantine.

Table 1
Patient demographics.

	Comparator (N=190)	Quarantine (N=185)	X ²	t	p- value
Gender					
Male (%)	102 (54%)	109 (59%)	1.044		.307
Female (%)	88 (46%)	76 (41%)	1.044		.307
Mean age (SD)	38.9 (16.1)	40.3 (13.9)		0.863	.389
Age Group					
<25	41	27	3.080		.079
25-34	57	42	2.569		.109
35-44	26	47	8.214		.004
45-54	28	35	1.173		.279
55-64	20	24	0.542		.462
>65	18	10	2.245		.134

3.5. Discharge information

Analysis of primary discharge diagnosis demonstrated a significant difference in the distribution of diagnoses between the two time periods ($\chi^2(9, N=365) = 20.50, p = .015$). Analysis was conducted for differences in the frequency of each individual diagnosis. Results demonstrated that during quarantine, there was a greater frequency of substance use disorder/substance-induced psychosis or mood episodes ($\chi^2(1, N=365) = 6.87, p = .009$) and a lesser frequency of eating disorders ($\chi^2(1, N=365) = 6.89, p = .009$). After correcting for multiple analyses, these differences did not remain significant (corrected $p = .006$).

3.6. Substance use

There was a significant difference in frequency of admissions with substance use involvement as a clinical concern, 45% of admissions in quarantine compared to 28% of admissions in the comparator ($\chi^2(1, N=369) = 11.59, p = .001$). Specifically, this refers to cases where substance use was thought to be directly involved in the current presentation. There was no significant difference in the frequency of admissions in which patients reported any current use of alcohol, cannabis, or other recreational substances. This refers to use of these substances in any capacity, irrespective of whether use was considered to be relevant to the patient's presentation. There was also no significant difference in the frequency of patients admitted with a diagnosis of substance use disorder that pre-dated the admission.

3.7. Social supports, housing, relationships, and employment

There were no significant differences between time periods in the frequency of patients who identify having social supports versus no supports, those who live with others versus alone, those who have secure housing versus being housing-insecure, those who are in relationships versus single, or those who are working versus not working.

There was minimal missing data (<10%) across almost all variables; the greatest amount of missing data was 17% for the variable of presence/absence of social supports.

4. Discussion

Our results suggest several differences in presentations to acute psychiatric services during the quarantine period. Specifically, data demonstrated an increase during quarantine of admissions in the 35-44 age bracket, admissions involving substance use, and admissions where involuntary status and seclusion were utilized. This indicates that public health restrictions had significant implications for acute care settings, and more broadly, for the mental health of the public. It is not expected that changes to mental health presentations are a result of the sequelae of Covid-19 infection, as Nova Scotia has experienced low case numbers compared to national averages with a cumulative 1638 cases as of February 2021 ("Coronavirus (COVID-19): case data, 2021"). As well, all patients admitted to acute care units were tested for Covid-19, with no positive tests during the study period.

An increase in admissions in the 35-44 age bracket suggests a vulnerability specific to this age group. This is in keeping with the case report literature presented in which patients of this age group presented with a first episode of psychiatric illness (Finatti et al., 2020; Huarcaya-Victoria et al., 2020; Shanbour et al., 2020; Valdés-Florido et al., 2020). Our data also indicated an increase in index admissions in this age bracket; however, our sample size was not large enough to demonstrate significance.

Additionally, our data supports the hypothesized etiology of changes in substance use resulting in changes to mental health outcomes during quarantine. In our study, there was documentation that either the patient or a collateral source endorsed changes in substance use being associated with their deterioration in mental health, or the treating

clinician reported concern that substance use had contributed to the current presentation. Individuals may have been changing their amount, type, or frequency of use during quarantine, possibly in response to increased stressors.

Analysis of the characteristics of admissions included differences in the length of stay; this was significantly shorter during quarantine. This may speak to changes in delivery of care during the pandemic; clinician concern for risk of infection could have facilitated earlier discharges. There may be utility in continued follow-up to examine longer term outcomes for patients with briefer admissions, such as rate of re-admission. Findings also demonstrated an increase in the frequency of involuntary admissions and use of seclusion during quarantine, suggesting an increased severity of illness, as these measures are only employed in cases of serious illness presentations. This appears to contradict the finding of shorter length of stay, however, could be accounted for by the increase of substance-related presentations. Some substance-induced psychiatric illnesses (e.g. substance-induced psychotic disorders) may present as acutely severe, but have a briefer course than primary psychiatric illnesses (American Psychiatric Association, 2013). Measures required for infection control, such as personal protective equipment and social distancing, may have also contributed to increased patient agitation and resulted in increased use of rigorous measures such as involuntary status and seclusion.

A significant negative finding is the lack of difference in the total number of admissions, and in the distribution of admissions across the 11-week periods. This differs from existing literature that demonstrated a decrease in mental health-related emergency department encounters during public health restrictions; for example, a retrospective analysis of psychiatric emergency consultations in Spain demonstrated a decrease of 38% during lockdown (Gómez-Ramiro et al., 2021). However, the authors also noted that the proportion of consulted patients who were subsequently admitted to inpatient care increased. This could suggest that the decrease in emergency department encounters does not reflect the population presenting with illness warranting admission, which would be in keeping with our finding of stable admission numbers. There is also literature suggesting a decrease in psychiatric admissions during quarantine, for example, findings from Clerici et al in Lombardy, Italy. (Clerici et al., 2020). However, this decrease was found to be due to a drop in voluntary admissions, which is in keeping with our finding of a higher proportion of involuntary admissions during quarantine. This negative finding may also reflect the relative stability in delivery of mental health services during quarantine in Nova Scotia, compared to other regions. For example, in Lombardy, Italy, there were dramatic changes to service delivery such as diversion of inpatient beds to Covid-19 wards and restriction of the outpatient encounters in which admissions are facilitated (D'Agostino et al., 2020; De Girolamo et al., 2020). In our region, both inpatient and outpatient services were able to operate at full capacity (with adaptations for virtual care) throughout the quarantine, which may have facilitated the stability of admission numbers.

Differences in the frequency of individual discharge diagnoses did not differ after correction for multiple analyses; specifically, we did not see a significant increase in presentations of psychotic disorders, as was found in the case report literature (D'Agostino et al., 2021; Finatti et al., 2020; Huarcaya-Victoria et al., 2020; Shanbour et al., 2020; Valdés-Florido et al., 2020). Again, this may be a result of insufficient sample size in our study. Other negative findings include that the frequency of index presentations did not differ between groups, nor did the presence of previous psychiatric illness. Factors including gender and social circumstances also did not differ. However, further investigation is required to determine if there are differences in these factors in the 30s-40s age group, who are suggested to be disproportionately impacted by quarantine.

Our results suggest that further study should focus on impacts of quarantine on adults in their 30s-40s. Investigation of stressors associated with quarantine that may disproportionately affect this group, such

as increased familial responsibilities (childcare, care of elderly parents) or financial impacts, should be explored. Further research should also seek to understand patterns of substance use during quarantine, including changes in patterns of use and individuals' reasoning for such changes.

Limitations of the study include a smaller sample size, however, this was dictated by the time frame of the public health quarantine measures. Data was collected from a single urban centre, thus limiting generalizability of results. As well, the comparator period studied was directly before quarantine; other designs have included comparison to data prior years (Clerici et al., 2020), which could account for seasonal changes in admission data. However, the number of admissions to acute care psychiatry at the QEII Health Sciences Centre was stable across months in 2019, with quarterly numbers ranging from 121-162, suggesting minimal seasonal differences. Additionally, research into seasonality in psychiatric admissions has not been consistent with a seasonal pattern that is specific to psychiatric diagnoses (Bakstein et al., 2020).

In conclusion, this study demonstrates that quarantine has significant impacts on presentations of acute psychiatric illness. Specifically, there is an increased vulnerability in individuals aged 35-44; further understanding of this will allow for preventative care measures. Additionally, there is a demonstrated impact of substance use associated with quarantine, and therefore a need for targeted public health interventions as communities continue to navigate the Covid-19 pandemic.

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Declaration of Competing Interest

Dr. Nejati, Dr. Crocker, Dr. Kolajova, Dr. Morrison, Mr. Simon, and Dr. Sridharan have no declarations of interest or financial supports to declare.

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