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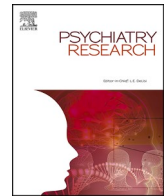
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Changes in psychiatric services dynamics during the COVID-19 pandemic: Recognizing the need for resources shift

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ABSTRACT

With the significant impact of COVID-19 pandemic on the health, and the functioning of health care system, it has become increasingly important to understand changes in the ways health services were utilized and the factors influencing it. Drop in psychiatric admissions was seen during the pandemic, but also an increase in acute hospitalizations and emergency visits. Our aim was to analyze changes in out- and in-patient services utilization in the largest Croatian psychiatric institution during the first year of the pandemic, observed through the lens of the stringency index, and compare it to the pre-pandemic year. Along with an overall drop in hospitalizations, but a unit-specific rise in hospitalization, we have observed a non-significant overall drop in regular outpatient visits, and a significant drop coinciding with strictest epidemiological measures. There was also a significant increase in emergency visits coinciding with epidemiological measures that failed to return to pre-pandemic values, pointing to an expected significant and prolonged burden on emergency services. Simultaneous analysis of changing dynamics of mental health care service utilization during the pandemic helps us identify specific points of increased burden, and help us plan for early and flexible resources shift in order to adequately respond to evolving challenges.

1. Introduction

The ongoing COVID-19 pandemic has taken its toll on health worldwide, and it has affected social and economic conditions in ways that we are still coming to terms with. It has also specifically affected the functioning of medical services, straining existing resources and opening questions about inherent weaknesses and capacity for fast optimizations and changes within the system. Although the pandemic has primarily affected health care services directly involved in treating somatic COVID-19 complications, mental health services have also experienced a significant change in service needs (Fasshauer et al., 2021, Fasshauer et al., 2021, Gómez-Ramiro et al., 2021). While the pandemic is still not over, enough time has passed since its beginning that we can analyze the effects it has had on mental health services. It has become evident that lockdowns we experienced have not affected rates of psychiatric hospitalizations in the way that was expected by some at the onset of the pandemic (Yalçın et al., 2021, Ambrosetti et al., 2021). Several studies

confirm that psychiatric hospitalization rates have fallen during lockdowns in Europe and Australia, but also in other parts of the world (Fasshauer et al., 2021, Gómez-Ramiro et al., 2021, Yalçın et al., 2021, Hakansson and Grudet, 2021, Simpson et al., 2021, Ilic et al., 2011, Cesarec et al., 2013). During the lockdown, the number of all services utilized by patients fell by 12% to 37%, depending on the country (Gómez-Ramiro et al., 2021, Yalçın et al., 2021, Balestrieri et al., 2021). A trend that can be observed in the literature is that, although the hospitalization rates have fallen, the number of emergency visits has, in many cases, risen (Fasshauer et al., 2021, Gómez-Ramiro et al., 2021, Rømer et al., 2021). However, only a handful of studies analyzed the trends over a longer period, not just the lockdown, and to our knowledge, no study so far analyzed all of the service modalities (inpatient vs. outpatient) simultaneously. In studies that did analyze the whole first pandemic year, the drop in hospitalizations was evident, but the numbers differ from country to country (Yalçın et al., 2021, Hakansson and Grudet, 2021, Simpson et al., 2021, Rømer et al., 2021). A World

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Health Organization (WHO) study showed that the pandemic has disrupted or delayed mental health services worldwide (World Health Organization 2020). A Lancet study showed that 60% of the surveyed countries suspended psychotherapy services, and around one third reported barriers to access psychiatric treatments and emergency interventions (The Lancet Infectious Diseases 2020).

Croatia initially enforced a strict lockdown in March of 2020, along with a number of anti-epidemic measures and measures for reorganization of health services in order to provide adequate care for those infected with SARS-CoV-2. First lockdown measures were gradually liberalized starting in late April, finally ending mid-May of 2020, but were subsequently partially reintroduced in response to new waves of infection. At the onset of first lockdown, psychiatric in-patient and emergency services continued to operate, although per instructions in-patients numbers were reduced through stricter identification of deferrable cases, while day hospitals and outpatient visits experienced more severe disruptions and were later moved at least in part towards online programs (Hale et al., 2021, Medved and Rojnic-Kuzman, 2021). Psychiatric care at COVID-19 units was organized through liaison services (Hale et al., 2021). Continuity of specialized interventions such as electroconvulsive therapy (ECT) was ensured during the pandemic through application of specific disease prevention measures and modifications of usual practices at the Clinical Hospital Centre Sestre Milosrdnice, after an initial suspension during the first lockdown (Medved and Rojnic-Kuzman, 2021).

Understanding how the population is accessing mental healthcare services, whether emergency or regular, during the pandemic and the changes in specific needs is crucial for identifying immediate priorities and longer-term strategies for providing adequate mental health care. The insight into these dynamics can help mitigate adverse mental health consequences for vulnerable groups and avoid or minimize possible backlogs. In line with this, we have analyzed outpatient visits, hospitalizations, and emergency visits in parallel during the pandemic, to evaluate in more detail the changing dynamics in all three aspects of providing mental health care during a crisis and identify specific needs that can be anticipated and addressed in future outbreaks or catastrophes.

2. Methods

To assess the changes in dynamics of accessing mental health care and the possible subsequent burden at different points in the health care system, we performed a retrospective analysis of the number of patients seen in the same catchment area; at the University Psychiatric Hospital Vrapče. We extracted admissions data, data on regular visits through usual outpatient services, and emergency visits data for the period between January and December of 2020 and the same period in 2019. Observed periods were compared to see if there were significant changes in the utilization of different mental health services. All of the obtained clinical data, i.e. diagnosis according to ICD-10, was grouped as follows: dementia group (F01.x - F03.x); psychoorganic disorders group (F06.x - F07.x); substance use disorders (F10.x - F19.x); schizophrenia spectrum disorders group (F20.x + F22.x + F25.x); acute psychosis group (F23.x + F28.x); bipolar disorder group (F31.x); depressive disorders group (F32.x - F33.x); stress related disorders (F43.x); and personality disorders group (F60.x - F69.x). We excluded from the analysis all of the diagnoses that were not directly related to psychiatric conditions, including neurologic disorders (G diagnosis in the ICD-10).

To additionally see how the introduced epidemiological measures impacted utilization of mental health services, we used the stringency index, a composite measure of government policies based on nine response indicators including school closures, workplace closures, and travel bans, with values in the range from 0 to 100 (100 = strictest) (Skrobo et al., 2021).

2.1. Statistics

Frequencies of the above-mentioned parameters were statistically compared using the Chi-Square test. P values lower than 0.05 were considered statistically significant. In multiple comparisons tests, p-values were corrected using Benjamini and Hochberg's false discovery rate correction method (Benjamini and Hochberg, 1995). Statistical analysis was made by custom scripts written in Python 3.8. using statsmodels library. The results of the descriptive statistics are presented as mean \pm SD.

3. Results

When looking at all of the psychiatric diagnoses as a whole and comparing the pandemic year to the previous year there are several significant differences to observe, as well as the relationship these changes had in regards to the stringency index (Fig. 1.).

In 2019, 7018 patients were hospitalized in the University Psychiatric Hospital Vrapče, and the following year there was a statistically significant drop (5002 patients hospitalized). When looking at differences in certain months, the observed data suggests a statistically significant increase in the pandemic year in the months June and August ($X^2 = 21.29$ and $X^2 = 5.87$; both $P < 0.001$) and a statistically significant decrease in the month's March, April, and November when compared to 2019 ($X^2 = 10.48$, $X^2 = 79.14$, $X^2 = 19.15$; $P < 0.001$) (Fig. 1.).

During 2019 in Hospital Vrapče we had 10736 outpatient visits, and this number dropped to 9484 in 2020, showing no statistically significant difference between the observed periods overall (Fig. 3.). However, during June, July, August, and September, there was a statistically significant increase in outpatient visits in 2020, while during March and April, there was a significant decrease in outpatient visits, coinciding with the lockdown period. When looking at specific diagnostic groups, a statistically significant decrease in regular outpatient consultations can be seen for psychoorganic disorders group (F06.x - F07.x), schizophrenia spectrum disorders (F20.x + F22.x + F25.x), personality disorders (F60.x - F69.x), and depressive disorders (F32.x - F33.x), while no statistically significant increase was observed for any of the observed groups. Finally, we did not find any statistically significant differences in gender or differences within the same gender in the observed period.

With 1413 emergency services visits in 2020, we observed a statistically significant increase in comparison to 2019, when only 967 visits through the same services were recorded (Fig. 2.). Although we observed an overall increase in emergency consultations, we did not find any statistically significant differences among different diagnostic groups, except for a statistically significant decrease in emergency services visits in 2020 for the dementia group (F01.x - F03.x). Furthermore, we did not find any difference in the gender distribution for emergency visits during that period.

4. Discussion

The COVID-19 pandemic has expectedly started an early conversation on the direct and indirect mental health costs of the pandemic, but also specifically on the changes in the mental health services during this challenging period, the care they provided, their accessibility, and the burdens they experienced in providing adequate care. While there was almost a consensus on anticipated and reported effects on mental health throughout the world (Türközer and Öngür, 2020), reports on the drop in psychiatric hospitalizations, an effect that seemed to mimic the one seen in previous pandemics like the Spanish flu (Vukojević et al., 2021), called for a more careful evaluation of the possible factors influencing that drop, and what that meant for the overall utilization of psychiatric services and indicators of the need for those services.

If we imagine an absurdly simplistic model, in which mental health changes and needs are charted on one axis and the utilization of mental health services on another, we would expect any significantly traumatic

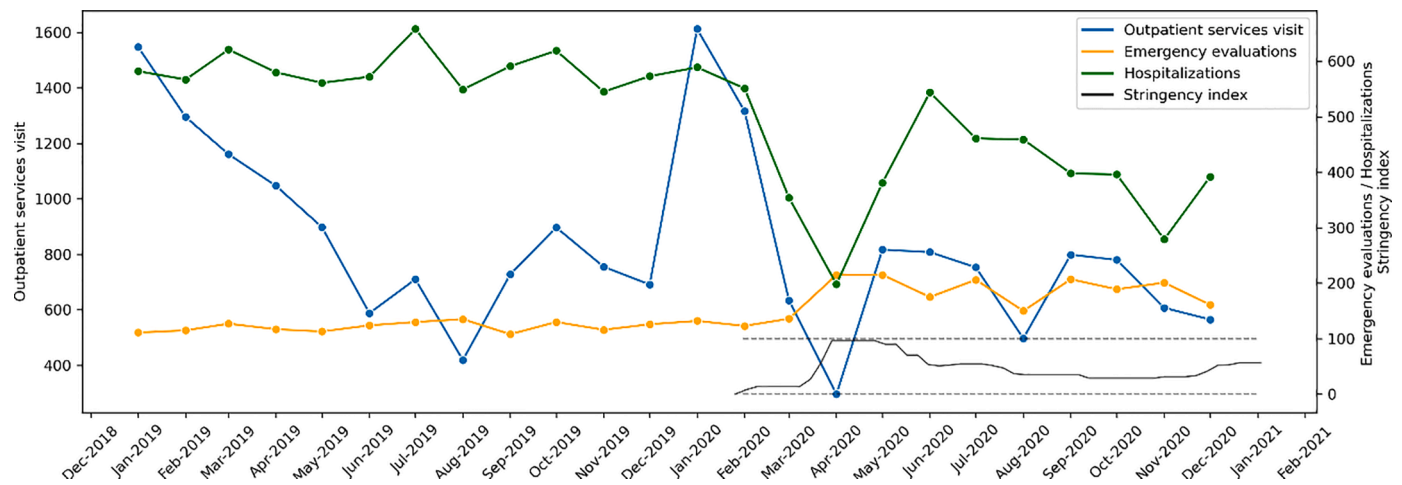


Fig. 1. The number of patients utilizing all psychiatric services during 2019 and 2020. Trends in the number of in-patients (green line), outpatients (blue line), and emergency evaluations (yellow line) at University Psychiatric Hospital Vrapce during 2019 and 2020. The gray line represents the stringency index for the year 2020.

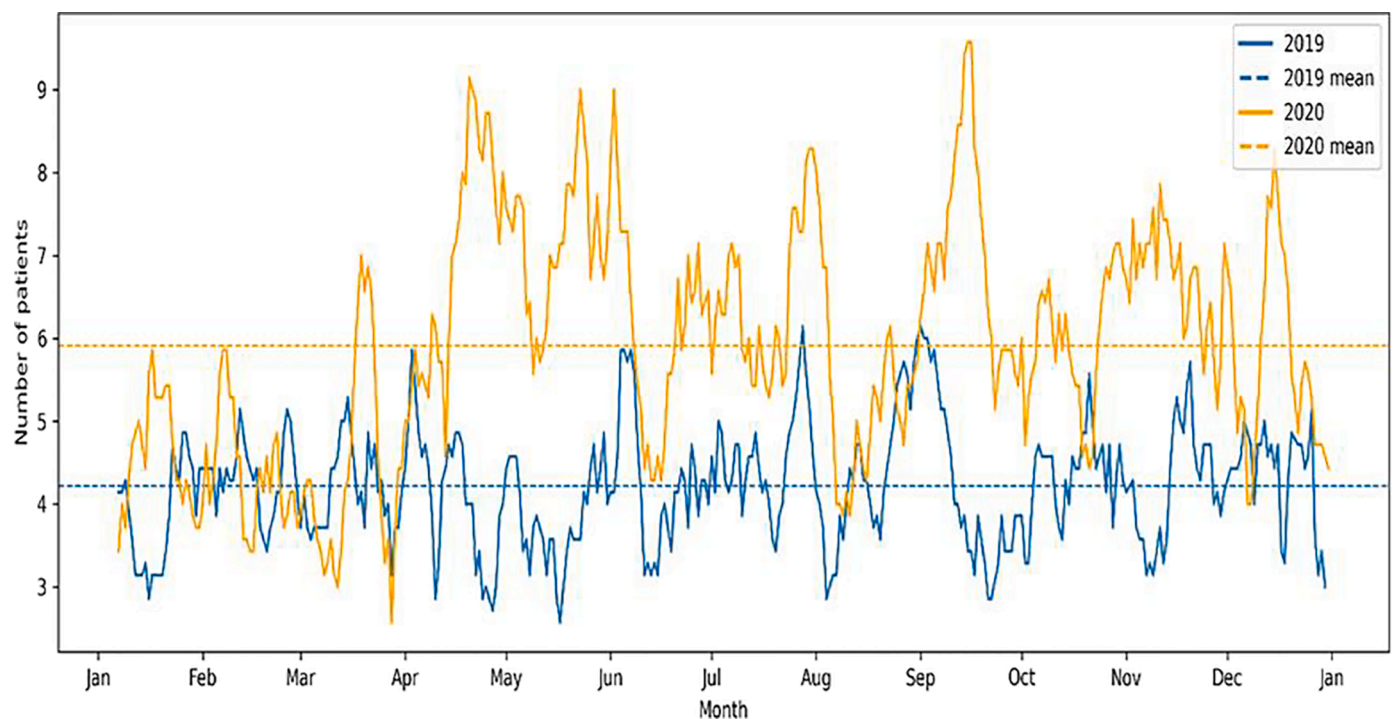


Fig. 2. The number of patients using emergency psychiatric services during 2019 and 2020. Trends in the number of emergency evaluations at the University Psychiatric Hospital Vrapce during 2019 (blue line) and 2020 (yellow line), while the dotted line represents the mean for the corresponding year.

event to lead to an almost linear function, at least in the beginning. An increase in the burden of symptoms and associated needs would lead to an increase in service utilization. That simplistic model would, among other factors, hinge on the availability of adequate services, but more importantly, it would be challenged the moment we see a reduction in service utilization at the same time we note an increase in stress and linked depression and anxiety, as we see with the drop in psychiatric hospitalizations during the pandemic. Looking at such a trend, we naturally realize that various other factors influence elements of the model at different stages, such as resilience (Vukojević et al., 2021, Ćurković, Košec and Ćurković, 2020), but also, more importantly, we realize that "services" cannot be viewed as a single factor that is comparable across different health care systems. Furthermore, we realize

that the dynamics of the change over time might be more informative than the absolute observed change, as it might more accurately point to specific elements affecting the model. Previous work has already reported on differences that become obvious when acute psychiatric hospitalizations and general psychiatric admissions are looked at separately, with a decrease in admissions but an increase in acute psychiatric hospitalization during the pandemic (Fasshauer et al., 2021, Gómez-Ramiro et al., 2021, Rømer et al., 2021).

While we previously reported a drop-in in hospitalizations during 2020 in the largest psychiatric institution in Croatia, we now compared it to changes in the dynamic of emergency evaluations (24-hour emergency services) and the changes in the dynamic of regular outpatient visits to the same institution. The largest psychiatric institution in

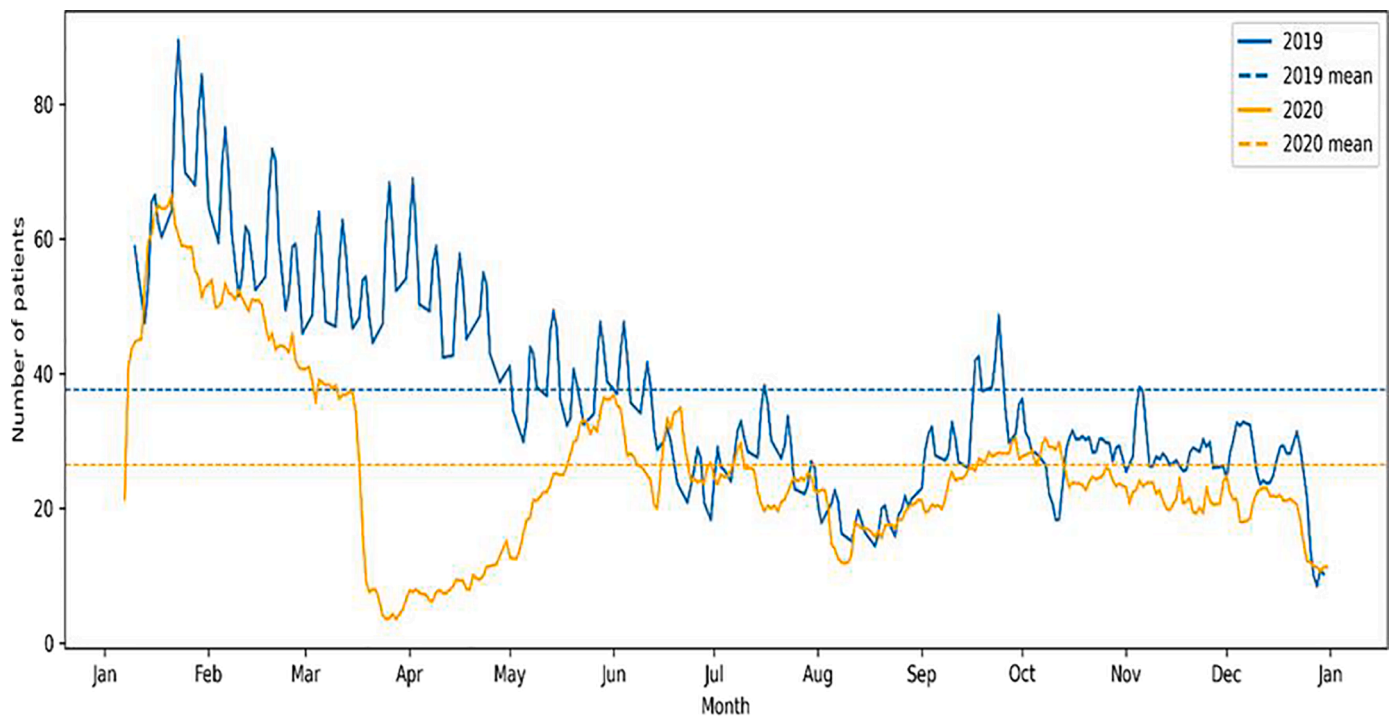


Fig. 3. The number of patients utilizing outpatient services during 2019 and 2020.

Trends in the number of emergency evaluations at the University Psychiatric Hospital Vrapce during 2019 (blue line) and 2020 (yellow line), while the dotted line represents the mean for the corresponding year.

Croatia, located in the capital city of Zagreb and offering different types of services, in our opinion offered a unique window into changes in the functioning of mental health services during the pandemic. When comparing the first year of the pandemic (2020) to the previous pre-pandemic year, overall there was a significant drop in the number of those hospitalized, but looking at month-by-month changes, we can see that in June and August of 2020, there was interestingly a statistically significant increase. The increase in June and August can perhaps be attributed to the fact that there was no additional drop in hospitalizations during the summer months that we usually expect to see. In March, April, and November a significant drop in those numbers was noted, with the initial drop corresponding to the strictest epidemiological measures, and the November one coinciding with the rise in COVID-19 cases. Since previously agreed on hospitalizations as well as acute admissions take place through the same services, it was, unfortunately, impossible to differentiate between those two. The relative number of acute ones, however, is most likely to have increased in the first year of the pandemic.

At the same time, regular outpatient visits also dropped overall, but that drop was not statistically significant when comparing 2020 to 2019. However, even though there was a non-significant reduction, when looking at changes by months we can see that four months show a statistically significant increase in outpatient visits (June, July, August, and September). Interestingly, as with hospitalizations those four months are on average expected to show a decrease in outpatient visits given the summer vacation season, a trend that was absent arguably at least in part due to fewer people travelling during the first year of the pandemic. Additionally, while hospitalizations and outpatient visits do not seem to follow the same patterns of change during the pre-pandemic year, as one might expect, in 2020 they show a synchronized drop during the initial lockdown in Croatia, which was the strictest one in Croatia during the entire pandemic.

Whatever we are inclined to see as dominant variables influencing how we provide in-patient and outpatient mental health care and how people access them, it is clear that utilization of those services will

depend on much more than the need for them in the population. Objective obstacles created by the pandemic, whether it is the fear of an individual from interacting with others, or the society's reaction to the pandemic with attempts to protect the health and the functioning of the system (e.g., lockdowns or measures to disincentivize non-emergency visits to medical facilities), will prove to be a significant factor influencing mental health care. Consequently, we assume that emergency visits reflect the possible increased need for psychiatric services in the population more objectively, since, as previously mentioned, obstacles are bound to influence them to a lesser degree. In line with that assumption, we did find a statistically significant increase in visits to the 24-h emergency services, which was interestingly not driven by any specific diagnostic group. The drop in the number of those with dementia who visited emergency services was somewhat to be expected, as the elderly were additionally discouraged from leaving homes because of the associated risk.

If we look at visits to emergency psychiatric services as an ersatz indicator of the increased need for mental health care in the population, it is interesting to note that, even after the initial lockdown, numbers of emergency visits stayed higher than in the pre-pandemic year. That lag in return to baseline values points possibly to a steadily increased need in the population that is for various reasons not completely met through recovering outpatient services. If we assume that the rise in emergency visits happens due to reactions to traumatic events or elevated stress levels, we would expect to see an increase in "acute diagnoses" like the acute stress reaction, which was not the case. Although such claims can not be made without further analysis, it is possible that relatively stable proportions of different diagnostic groups points to difficulties in accessing regular services as the dominant factor. We can also conclude that it is not the only factor as the "rebound" in outpatient services was not followed by significant reduction in emergency visits. Regular outpatient visits experienced a relatively stable return to almost pre-pandemic levels after the first lockdown, and while their dynamic varied with subsequent epidemiological measures, there were no additional dramatic drops. In the case of University Psychiatric Hospital Vrapce,

the return of the outpatient visits numbers to pre-pandemic values was fostered and maintained by the fast introduction of online outpatient programs and consultations.

From reported changes in the first year of the pandemic, we could be quick to conclude that emergency psychiatric services carry the brunt of the pandemic, and, given the drop in hospitalizations and at least initial drop in outpatient visits and slow return to pre-pandemic values, need to be the focal point of redistributing resources during prolonged traumatic events, but that would be a severely reductionist approach. Even though we saw a drop in hospitalizations, if we look at hospitalizations by different departments, it becomes clear that the drop is driven by the majority of the departments, but those departments that cater to acute emergency admissions can experience a significant increase in hospitalizations as they are more likely to be converted into sole entry points into the hospital. Department of Diagnostics and Intensive care that became such an entry point in University Psychiatric Hospital Vrapče, indeed saw an increase in hospitalizations, from 1720 in 2019 to 2099 in 2020 (on average 32 acute hospitalizations more every month). That increase in hospitalizations at specific departments, combined with the additional burden of organizing work in line with specific epidemiological measures imposed to prevent the spread of the infection through the healthcare system, means that we have another part of the system that will experience additional burden.

If we remember the previous assumption that the return of outpatient visits numbers to pre-pandemic levels rests on the introduction of novel means of providing care (i.e., online services), where those were not previously available and widely used, we identify another point that will need an investment of additional resources to maintain the level of care.

Although generalizations of processes seen in health care at a specific institution, region, or country are rarely a linear endeavor, as they omit specific conditions existing due to baseline differences in the organization of different parts of the system and the way the care is provided, its flexibility, resilience, and additional resources available, we can still tentatively recognize certain trends that might be seen in a pandemic:

- Drop-in hospitalizations and outpatient visits, associated at least in part with epidemiological measures and following their dynamics;
- Increase in hospitalizations at specific acute units that become "entry points";
- Increase in emergency services visits that remain relatively stable regardless of changes in epidemiological measures, which seems to compensate at least in part the reduction in other services but also reflects the increase in the overall need for mental health services.

If we are to accept such trends during a pandemic, we can then anticipate at least to a point the changes in the needs and the parts of the system that will carry most of the burden, allowing us to plan for flexible relocation of resources to those "pressure points". Early and adequate relocation of resources would allow for seamless continuation of care and addressing in a timely manner additional needs that will certainly arise. This approach is vital, as any lag in the care might result in added burden in the later stages of the pandemic or after it ends. With expectations that we will be experiencing a post-Covid mental health problems pandemic, any action that might relieve part of its burden is valuable. Even if we assume that we are too late to make any significant changes in the present pandemic, we are tasked with learning from it and preparing adequate mechanisms for any future ones.

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CRedit authorship contribution statement

Aleksandar Savić: Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Jakša Vukojević:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Supervision. **Ivan Mitreković:** Data curation, Writing – original draft, Writing – review & editing. **Mihovil Bagarić:** Data curation, Writing – original draft, Writing – review & editing. **Andrija Stajduhar:** Conceptualization, Formal analysis, Writing – original draft. **Neven Henigsberg:** Conceptualization, Supervision, Writing – original draft, Writing – review & editing. **Petrana Brečić:** Conceptualization, Supervision, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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