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Telemedicine during the SARS-Cov-2 pandemic lockdown: Monitoring stress and quality of sleep in patients with epilepsy

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ABSTRACT

SARS-CoV-2 pandemic heavily hit the western healthcare system saturating the hospital beds in wards and clogging the emergency departments. To avoid the collapse of Italian hospitals, office visits to outpatients were limited to emergencies and the general population went in a lockdown state. Physicians had to approach new problems in the management of chronic patients who could not leave their homes. In our experience as epilepsy clinic, the use of telemedicine was of crucial importance for monitoring our patients: phone call during lockdown let us monitor the stability of our 38 patients and psychometric parameters and habits that could influence seizures frequency. In particular, we found that in our patients, sleep quality was low resulting in high daily sleepiness and associated high stress levels. Secondly, we found an increase in daily screen hours and an association with daily sleepiness. In conclusion, we report our experience in managing people with epilepsy during the lockdown, underlining the utility of telemedicine as a valid monitoring tool and the necessity of a psychometric and behavioral screening.

1. Introduction

The entire world is facing coronavirus disease 2019 (COVID-19), due to a novel coronavirus (SARS-CoV-2) that causes a severe respiratory syndrome, which may require hospitalization or even ICU admission. The high rate of contagions and the consequential ward admissions caused an overflow of patients to the hospitals, saturating healthcare systems [1].

Italy was one of the most precociously involved countries by the COVID-19 outbreak: the first case was recorded on February 18th and since then the disease rapidly spread over the state. On March 9th, the Italian Ministry of Health reported 7985 confirmed cases [2] and the authorities imposed a nation-wide lockdown that lasted until May 3rd. During this period, the population was allowed to leave home only to purchase essential goods, to seek urgent medical care, and to attend only "essential" jobs. Those were unprecedented measures in recent Italian history that forced general population to live in an unfamiliar setting.

Moreover, the fear of contagion had a major impact on how people sought for medical assistance for chronic and even acute conditions. Indeed, we described, in a recent paper, that the Emergency Department admissions for seizures decreased during the lockdown [3]. Similarly, this phenomenon has also been described for other life-threatening acute neurological conditions such as stroke [4].

The management of patients with chronic conditions was complicated by the necessity of maintaining a standard of care even if patients were unable, due to the pandemic situation, or unwilling, due to the fear of contagion, to attend face-to-face medical examinations.

Epilepsy is one of the most common neurological conditions with 50 million people affected worldwide and it is a leading cause of disability and mortality [5]. During lockdown, healthcare providers had to face major issues regarding patients with epilepsy: lockdown itself could increase the risk of AED withdrawal [6] and follow-up of patients with drug-resistant epilepsy became difficult. Moreover, it is well known that people with epilepsy are prone to suffer from mental health conditions as anxiety and depression that could be enhanced by the isolation period and from the mediatic resonance of the ongoing pandemic [7].

Phone contact was the more widely adopted strategy to monitor people with epilepsy as it represents a cheap and effective tool in follow-up [8]. Teleconsultation can be used to assess the frequency and severity of seizures, the adherence to treatment, and side effects. We decided, in our epilepsy unit (Clinical Neurology Department, University Hospital of Trieste, Italy), to adopt telemedicine to monitor patients with epilepsy during the lockdown, in order to guarantee their safety. In our experience even more sophisticated telemedicine tool showed to be useful even in other acute conditions [9].

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The aim of this work was to describe our experience in epilepsy management using telemedicine during the pandemic. In addition to the routine interview, we also assessed some aspects of the life quality during the lockdown that could affect the frequency of seizures, in particular sleep quality and stress levels.

2. Materials and Methods

We proposed to all patients with an outpatient visit scheduled in the Epilepsy outpatient clinic, Neurological Department, Ospedale Cattinara Trieste during the lockdown period (from March 9th to May 3rd 2020) to replace the office visit with a teleconsultation via phone call; all 38 patients accepted and gave their consent to participate in the study. A trained epileptologist contacted the patients directly and performed a survey designed to collect basic clinical information (seizure frequency, duration, semiology, and adherence to therapy), information on the lifestyle changes during the lockdown period (social isolation, working modality, working hours, changes in screen hours, weight gain, or increase in alcohol intake and benzodiazepine assumption). In addition, we tested 3 epilepsy-related psychometric variables using 3 questionnaires: sleep quality (PSQI), daily sleepiness (ESS), and psychological distress (K-6). Data regarding possible SARS-CoV-2-related symptoms, exposure to infected patients, and execution of nasal swabs were also collected. At the end of the interview, patients were asked to rate the satisfaction of the teleconsultation with a 5-item Likert scale, from a minimum of very unsatisfied (1) to a maximum of very satisfied (5). Data are reported as mean ± standard deviation or number (%) as appropriate. We performed a statistical analysis in order to compare working hours and screen hours before and during lockdown (Wilcoxon test, p-value <0,05). We performed a stepwise multivariable linear regression to determine factors (K6, age and variation screen hours, working hours and weight variation) with PSQI and ESS scores. Results are presented as B and 95% confidence intervals (95% CI). A value of $p < 0.05$ was considered as significant. The present study was approved by local ethics committee.

3. Results

Demographic and clinical features of the 38 included patients are summarized in Table 1, while lifestyle changes reported during the lockdown period and psychometric tests are reported in Table 2. The majority of patients tested were clinically stable since 87% of them reported no seizures during the past 6 months and most of them were diagnosed with focal epilepsy. Only 4 patients experienced seizures during the lockdown, but they did not report an increase in seizure frequency. No difference in the number of seizures or in their duration was detected when comparing mean monthly seizure number before and during lockdown. Patients were prescribed, in most cases, AED monotherapy and they reported strict adherence to prescriptions. None of our patients declared an increase in benzodiazepine consumption and only one reported an increase in alcohol assumption. Only 7 patients reported an increase in food intake, while just 1of them reported a decrease in it. 12 patients gained weight and no one lost it. Results of K-6 inventory revealed that 14 patients scored more than 13, thus suggesting a severe psychological distress [10]. 22 of our patients scored more than 5 in PSQI, which highlights a poor sleep quality [11]. Finally, 9 of them scored more than 10 in ESS, suggesting a high daytime sleepiness. We found an increase in the mean daily screen hours (p<0.001) and a decrease in the mean daily hours worked (p=0.011) during lockdown. We also found that higher scores in K-6 inventory were correlated with higher results in PSQI (p<0,001). Moreover, variation in daily screen hours were related to higher ESS (p=0,030). An association between age and higher scores in ESS was also detected (p=0,014). The other independent factors were excluded by the stepwise regression (Table 3). Patients participating in the study reported high levels of satisfaction regarding teleconsultation (Likert scale 4.68 ± 0.53) and no differences between sex were detected (t-test p=0,602).

Table 1
Demographic and clinical features.

Gender M/F	16/22
Age (years)*	49.55 ± 16.50
Diagnose	
-Focal seizures	28 (74%)
-Focal seizures without impairment of consciousness	8 (21%)
-Focal seizures with impairment of consciousness	20 (53%)
-Generalized onset	10 (26%)
Therapy	
-Monotherapy	28 (74%)
-Polytherapy	10 (26%)
Last seizure	
<6 months	5 (13%)
>6 months	33 (87%)

*Data are expressed as mean ± standard deviation or number (%) as appropriate.

Table 2
Lifestyle changes during lockdown and results of psychometric tests.

Regular adherence to therapy	
Yes	35 (92%)
No	3 (8%)
Social isolation	
Yes	29 (76%)
No	9 (24%)
Working modality	
Not working	24 (64%)
Smart working	7 (18%)
Essential worker	7 (18%)
Pre-lockdown hours worked	2.90 ± 3.54
Hours worked during lockdown	2.09 ± 3.07
Mean daily worked hours variation	-0.82 ± 1.94*
Mean weight gain	0.55 ± 1.40
Pre-lockdown screen hours	3.43 ± 1.95
Screen hours during lockdown	4.29 ± 2.49
Screen hours variation	0.86 ± 1.47**
Epworth Sleepiness Scale	7.03 ± 4.47
≤5	15 (40%)
6-10	14 (37%)
11-12	4 (10%)
13-15	4 (10%)
≥16	1 (3%)
Pittsburg Sleep Quality Index	7.45 ± 6.11
<5	16 (42%)
≥5	22 (58%)
K6 inventory	11.82 ± 4.70
<13	24 (63%)
≥14	14 (37%)
Teleconsultation satisfaction	4.68 ± 0.53

Data are expressed as mean ± standard deviation or number (%) as appropriate. *p<0.05 **p<0.01 (Wilcoxon test)

4. Discussion

We report, in the present study, our experience in monitoring, through telemedicine, patients with epilepsy during COVID-19 pandemic. The patients we interviewed were frequently clinically stable and only 5 of them reported a seizure occurring in the previous 6 months. None of them required urgent face-to-face evaluation in the Emergency Department. While the routine interview

Table 3
Stepwise multivariable linear regression for association between PSQI and ESS.

PSQI			
	B	CI 95%	p
K6 questionnaire	0.844	0.509 – 1.179	<0.001
ESS			
	B	CI 95%	p
Age (y)	0.105	0.022 – 0.187	0.014
Screen hours variation (h)	0.032	0.109 – 1.956	0.030

Notes: PSQI = Pittsburg Sleep Quality Index, ESS = Eporth Sleepiness Scale. Only significant predictors analyzed with the stepwise method are reported.

did not highlight major concerns, further investigation through the questionnaire revealed some valuable data.

4.1. Psychometric results

The K-6 inventory results indicate that our patients suffered from high levels of psychological distress during the lockdown. It is well known that people with epilepsy are more susceptible to anxiety, depression, and more generally to mental illness [12]. This susceptibility is crucial since the ongoing pandemic is causing in the general population [13], and in particular in people with epilepsy [7], an increase in stress. High psychological distress levels are linked with decreased sleep quality and with high levels of daily sleepiness. We found that most of our patients suffered from poor sleep quality (58% of the patient has scored >5). This finding is consistent with a recent study [14] that analyzed the quality of sleep in people with epilepsy in pre-COVID-19 period. They reported that 24% of people with epilepsy had an ESS score $\geq$10 and 42,7% had a PSQI score $\geq$5. In our study, we found similar scores in ESS (23% $\geq$10) but a higher percentage of pathological PSQI (58% $\geq$5). These data could be justified by the higher prevalence of poor sleepers in the general population during the lockdown. Indeed, in a recent study Cellini et al. reported an increase in pathological PSQI (> 5) of 11.9% in general population [15]. Higher scores in K-6 were strongly related to higher results in PSQI; this finding suggests that psychological distress during the lockdown was affecting our patients' rest. Probably stress is not the only factor influencing sleep quality during the lockdown, indeed we found an association between the increased screen hours and daily sleepiness. Sleep is one of the most important variables to monitor in people with epilepsy, as sleep deprivation is a major trigger for seizures. In this particular setting, the importance of sleep hygiene should be remarked and clinicians should screen their patients for sleep disturbances. Treatment underlying psychiatric conditions and the avoidance of stress factors should also be considered as it could improve sleep quality, and it could be appropriate to prescribe a psychiatric consultation, if necessary. Age was also correlated to increased sleepiness. Promptly identifying a subpopulation with a higher risk of developing stress and sleep disturbances should also be important: we found higher results in ESS in older people; therefore, we suggest that elders' sleep quality should be strictly monitored. Our findings are consistent with a recent study demonstrating an increased anxious state and sleep disturbances in people with epilepsy [16]. Those results could be underestimated in our study as we analyzed a population of mainly seizure-free patients. In patients with drug-refractory seizures, those findings could be even more relevant.

4.2. Variation of clinically relevant habits

The analysis of our data showed that patients had a significant increase in daily hours of exposure to screen during lockdown. These data, in association with the reduction of mean daily hours worked could indicate that screens were mainly used for recreational purposes. Since photosensitivity is a main trigger of some types of epilepsy and as long as the increase in screen hours during lockdown seems to be also linked to entertainment, it is reasonable to advise people with epilepsy to limit unnecessary overuse of digital devices during home isolation [17]. Another significant reported datum was the weight gain during the lockdown; this finding could be explained by the reduction in physical activity and increased food intake [8]. Weight variations should be monitored as some lipophilic drugs pharmacokinetic can be influenced by the fat mass [18]. Some evidence suggests an increase in alcohol consumption in the general population during lockdown [19] and even if only one of our patients reported an increase in alcohol intake, we think that it is appropriate to oversee the consumption of alcoholic beverages during the lockdown in patients with epilepsy as it could increase the risk of new seizures. Higher psychological distress could be the basis of an increase in alcohol consumption [20], even more emphasizing the importance of monitoring the psychological condition in people with epilepsy.

4.3. Telemedicine utilization

Teleconsultation gave us the possibility to contact our patients during lockdown, resulting in a cheap and effective way to respond to the imposed restrictions. Telemedicine has been proved to be as effective as office visit in patients with epilepsy [8]. Our experience, similar to the others reported so far, shows that the performance of telephone visits was excellent, and patients did not need to be rescheduled. [21] Our patients reported high satisfaction levels for teleassistance: they preferred to be contacted as soon as possible instead of postponing the routine visit after the end of the pandemic. The high satisfaction level of our patients was probably due to the high efficacy and speed of the teleconsultation: neurologists can rapidly perform the routine visit assessing the stability of the disease and eventually modifying the prescription as appropriate to meet the best control of seizure possible. A recent analysis showed how telemedicine acceptance was associated with female sex [22]. In our study, the majority of patients were female (57,9%) and no differences in satisfaction level between sex have been detected. However, all 38 patients scheduled during the lockdown period accepted the telemedicine approach, so we cannot confirm the previously reported statement. Satisfaction of teleconsultation could change in a non-lockdown setting where it could be possible to choose between teleconsultation and face-to-face visit. The idea that telemedicine only lends itself for interviewing is untrue, as previously demonstrated [23]: our experience shows that simple neurological assessments can be performed remotely and that the use of teleconsultation is an easy, age-independent, diffuse tool in the general population. Moreover, telemedicine may have an invaluable role as a psychological relief and stress mitigator for isolated patients during the pandemic. We examined, in our study, only chronic patients afferent to our clinic. A face-to-face approach could remain necessary for the new or acute patients, for example, the ones presenting to the EDs [24]. In those cases, a safe environment to collect general information, including clinical and family history, seizure semiology, or performing additional testing (blood test, spinal tap test, electroencephalogram, or neuroimaging) could be necessary. Some peculiar conditions that require strict monitoring of clinical stability or precise titration of AEDs, like pregnancy, can benefit from telemedicine even in a non-pandemic context, resulting in a less time-expensive and more practical examination for patients. Finally, we have not experienced any difficulties in the administration of questionnaires over the phone, as opposed to previous reports [21]. In our practice a trained neurologist exclu-

sively read the queries to the patients who indicated their answer, without explaining them or any further comments. Answers from the patient were simultaneously collected on the printed version of the questionnaires.

5. Conclusions

The present paper describes our experience in managing people with epilepsy during the lockdown due to the COVID-19 pandemic. Telemedicine was a valid way to keep in contact with our patients. Neurologists should pay attention to sleep quality and psychological distress of people with epilepsy during the lockdown as we observed higher stress levels and poor sleep quality. We recommend to neurologists to give particular attention to patient education in avoiding habits that could increase the frequency of seizures during the lockdown and treating concurrent psychiatric comorbidities that could affect the quality of sleep.

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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