Effects of SARS-CoV-2 pandemic on follow-up and pharmacological treatment of chronic diseases in undocumented migrants

Gianfrancesco Fiorini,[1] Matteo Franchi,[2,3] Giovanni Corrao,[2,3] Roberta Tritto,[2,3] Sara Fadelli,[4] Antonello Emilio Rigamonti,[1] Alessandro Sartorio,[5] Silvano Gabriele Cella[1,2]

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ABSTRACT

Background All over the world, the COVID-19 pandemic, not unlikely other epidemics, has hit harder people in low socioeconomic conditions.

In Western countries, undocumented migrants are a growing component of this disadvantaged segment of the population. Their health conditions are frequently burdened by a number of chronic conditions, and they experience many difficulties in accessing public health services. Frequently, the only medical assistance they can get is provided by non-governmental organisations.

Methods We studied the medical records (including pharmacological treatments) of all patients attending the outpatient clinics of Opera San Francesco (OSF; a big charity in Milano, Italy), in the first 5 months of 2020. These comprise the outbreak of the pandemic and the lockdown period. The 1914 patients (1814 undocumented migrants and 100 Italians) seen during the lockdown were compared with those seen in the same period of 2019 and with those seen in the preceding months of 2020. We especially focused on three chronic conditions: cardiovascular diseases, diabetes and psychiatric disorders.

Results The number of consultations during the first 5 months of 2020 was much smaller than that of the same period of 2019. During the lockdown, we found 4048 consultations for 1914 patients, while they were 8051 in the same period of 2019 and 5681 in the first 2 months of 2020. The quantity of medicines dispensed by OSF showed a marked decrease in the period of the study and mainly during the lockdown.

The decrease in consultations and dispensation of medicines was most evident for psychiatric patients and almost not existent for patients with diabetes. Female patients suffered a more pronounced reduction.

Conclusions Western countries need strategies to better assist the very poor during epidemics.

Differences among different groups of disadvantaged persons should be taken into account when designing recovery plans.

Key messages

What is already known?

► Undocumented migrants are a growing and disadvantaged part of the population in many countries all over the world.
► Beside other difficulties, they have many problems in accessing even limited forms of medical assistance.
► Epidemics hit more severely persons who live in very poor socioeconomic conditions.
► Very little is known about the health conditions of undocumented migrants during COVID-19 pandemic.

What are the new findings?

► Undocumented migrants attending the outpatient clinics of a big charity in Milan, Italy, were much fewer than usual during the first wave of the pandemic and the following lockdown.
► This reduction in visits to the clinic affected also patients with chronic conditions, especially those with mental disorders, but not those with diabetes.
► Females suffered a greater reduction than males.

What do the new findings imply?

► Undocumented migrants with different chronic conditions behave differently. This can be important when evaluating their awareness of disease and long-term adherence to treatment.
► Strategies should be implemented to ensure medical assistance to undocumented migrants and especially to those among them who appear to be more vulnerable: patients with mental health problems and female patients.
► This should be considered both in periods of emergency, as COVID-19 pandemic, and when designing truly equitable recovery plans.

INTRODUCTION

The SARS-CoV-2 emerged in late 2019. By the beginning of 2020, it became pandemic, and containment measures began to be implemented all over the world. In Italy, the first diagnosis of SARS-CoV-2 infection was made on 31 January 2020, when two Chinese tourists tested positive, but the virus is thought to have been present since many weeks before.

The government decided containment measures for almost all Northern Italy on 8 March 2020. These imposed severe restrictions on all non-indispensable activities and displacements. This lockdown continued until the end of May, when containment was progressively lifted. Respecting social distancing, wearing a face mask and avoiding excessive gathering together have never been cancelled, in consideration of the continuing presence of SARS-CoV-2 and its known mechanism of transmission.[1 2]

It has been demonstrated that containment measures can be at least partially effective in slowing down the spread of the virus and the consequent increase in mortality, though their efficacy depends on the level of virus penetration at the onset of confinement.[3–5]

Besides their impact on the epidemiology of COVID-19, these measures had multifaceted consequences both on people's health and well-being.

Psychological effects have been described by many researchers; they include emotional disturbances as anxiety, anger, confusion, depression and somatic symptoms as palpitations, breathing difficulties and insomnia.[6] These psychological disturbances appeared to be dependent both on non-modifiable (eg, female gender and work uncertainty) and modifiable (eg, physical exercise and prayer) factors; thus, the degree of resilience varied among individuals of the same population.[7 8] Some authors have also suggested that adolescents during COVID-19 lockdown were at risk for post-traumatic stress disorder and depressive and anxiety disorders; moreover, those already affected by psychiatric problems could experience a worsening of their symptoms.[9] Therefore, younger age and pre-existing psychiatric disturbances could be other important factors regulating the psychological impact of lockdown.

Both the pandemic itself and the lockdown had considerable effects on a number of diseases, though the role of confounding factors should also be considered. Age, for example, has an effect on the consequences of quarantine,[7 9] but it also has a role in determining susceptibility to infection.[10] This has an important consequence: populations of different age would have a different COVID-19 epidemiology.[11] For example, in countries with younger populations, as low-income countries, the expected incidence of COVID-19 and the consequent case fatality rates would be lower.[12] However, this could be at least in part counterbalanced by the shortage of adequate health resources, as it is unfortunately often the case in these countries. Both in low-income and high-income countries comorbidities and pre-existing non-communicable diseases (NCDs) play also a role.[13] In the former, it is possible that during a pandemic they could obtain even less attention than that they usually receive.[14] In the latter they could be associated with a worse outcome, since they are more frequent in the elderly. However, pre-existing NCDs are not only associated with a worse outcome of SARS-CoV-2 infection.[13] These diseases can be affected by the lack of physical exercise, the increased frequency of unhealthy lifestyles and the reduction of nutrients as vitamin D.[15]

Moreover, NCDs usually need continuous tratment, frequent adjustments of pharmacological therapies, periodic check-up and laboratory tests and, often, daily care by health professionals. All this becomes difficult during a pandemic and especially during a period of quarantine.[15] During the lockdown, nearly all patients with chronic conditions experienced changes in their everyday life, and almost one half of them reported an impact on their health conditions.[16]

Another important aspect is the reduction in hospital admissions for acute conditions, an example being acute coronary syndrome; this trend has been observed worldwide, even in countries with a low incidence of COVID-19.[17] The explanation is not yet conclusive. Fear to access emergency departments crowded with patients with COVID-19 may have a role, but the incidence of myocardial infarction immediately after lockdown could be truly reduced, as a consequence of reduced exposure to triggers as air pollution.[18]

Another very important consideration has to be made: epidemics, and the present is no exception, are not socially neutral. Since the 1918 Spanish influenza epidemic, we know that their incidence is different in persons of different economic conditions, with disadvantaged people being more affected.[19] This difference in morbidity and mortality reflects pre-existing ethnic and socioeconomic differences together with differences in chronic diseases and the social determinants of health.[20]

Moreover, lockdown implementation worsens the conditions of vulnerable parts of the population,[21] as undocumented migrants.[22]

More in general, it is now clear that in Western countries the most vulnerable segments of the population were hit more severely, and undocumented migrants are probably in the first place.[23]

This study evaluates a large sample of undocumented migrants attending a charitable outpatient clinic in Milano, Italy, in the months from the outbreak of the pandemic to the end of lockdown. Our aim was to evaluate the response to their health needs. We mainly focused on the necessity, for patients with chronic conditions, to continue their therapy without interruptions. This knowledge could be valuable to plan interventions for these and other disadvantaged persons during epidemics.

METHODS
Population
We studied the medical records of all the persons attending the outpatient clinics of Opera San Francesco (OSF), a non-governmental organisation (NGO) in Milan, Italy, assisting the poor. The population relying on OSF for medical assistance is predominantly composed of undocumented migrants, with a minority of indigent Italians. OSF has an electronic database of all patients. For each of them, demographic data, consultations, tests and

dispensations of medicines are recorded. Doctors run the clinics on a voluntary basis. Medicines are given for free to the patient at the end of each consultation, according to doctor's prescription. The pharmacists keep a digital record of each dispensation, which includes the drug identified according to the Anatomical Chemical Therapeutic (ATC) classification and the amount dispensed according to the Defined Daily Dose (DDD).[24] We have previously described this system of charitable health assistance in greater detail elsewhere.[25]

In this study, we evaluated the medical records of the patients who received medical assistance at OSF in the first 5 months (7 January to 31 May) of 2019 and 2020. These are the months comprising, in 2020, the prodromal phase, the outbreak and the attempt of containment (lockdown) of the pandemic.

After this preliminary analysis, we compared the data of the patients attending the charity from 8 March 2020 to 31 May 2020 (ie, the strict lockdown period; N=1914), with those of two other groups of patients. The first was made of all the patients who had received medical assistance by OSF in the same period of the previous year (N=3403); the second comprised all the patients seen at OSF from 7 January 2020 to 3 March 2020 (prelockdown period; N=2596). We considered necessary this double comparison, since this population is very unstable.

Statistical analysis

We produced descriptive tables showing the distribution of the number of drug prescriptions, overall and stratified by ATC classes of drugs used in the treatment of common NCD, in the lockdown period of 2020 as compared with the same period of 2019 and the prelockdown period of 2020. We considered the following NCD: cardiovascular diseases (ATC class C), diabetes (ATC class A10) and psychiatric disorders (ATC classes N05–N07). We then calculated the per cent changes in the number of prescriptions in the lockdown period, as compared with those prescribed in the same period of 2019 and in the prelockdown period of 2020.

We graphically represented the weekly distribution, along with 95% CIs, of the number of both drug prescriptions and consultations in the three considered periods by using the local polynomial regression smoothing (LOESS) method.[26]

In addition to the trend of the number of drug prescriptions, we also evaluated the temporal trend of the weekly distribution of drug quantity (expressed in terms of DDD/1000 patients), overall and stratified by the aforementioned specific ATC classes, in each of the three periods considered.

We further stratified the previous analyses, where appropriate, by age, sex and ethnicity.

All analyses were conducted using the V.9.4 of the SAS package (SAS Institute).

Patient and public involvement

This study does not involve patients and public consultation since it was based on electronic records available to researchers on demand, after approval of the appropriate ethics committee.
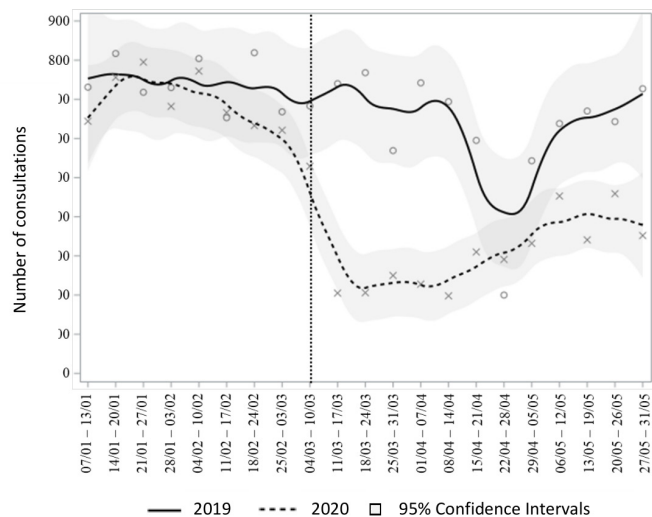
Figure 1 The figure shows the trend of the number of consultations at OSF during the period from 7 January 2019 to 31 May 2019 (solid line) and the same period in 2020 (dotted line). The vertical line indicates the date the lockdown was imposed in Italy (ie,8 March 2020). Trends of the number of consultations were smoothed using the LOESS method, in order to remove seasonality and casual fluctuations over time. Circles and crosses represent the number of visits observed in 2019 and in 2020, respectively. The grey areas represent 95% CIs. OSF.

RESULTS

At a preliminary analysis, we noticed that the number of consultations at OSF was much lower in the first 5 months of 2020 (from 7 January to 31 May) than in the corresponding period of 2019. This decrease was more evident in the weeks from 8 March to 31 May, corresponding to the period of lockdown (figure 1). Concomitantly, we observed a reduced dispensation of medications in the first 5 months of 2020 (26 292 in 2020 vs 41 057 in 2019, −36.0%).

The decrease in consultations during the lockdown was paralleled by a decrease in the number of patients accessing OSF outpatient clinics (1914 in 2020 vs 3403 in 2019).

The 1914 patients attending OSF during the lockdown were 914 males and 1000 females. Their median age was 42 years (q1=31, q3=53). The majority (n=1740; 91.1%) was in the 18–64 years age range; 44 patients (2.3%) were under 18 years, and 127 (6.6%) were 65 years and over. For two patients, age was missing.

They came from the following geographical macro areas: Mediterranean Africa: 253 (13.2%), sub-Saharan Africa: 116 (6.1%), Latin America: 909 (47.5%), Asia: 198 (10.3%), Eastern Europe: 324 (17.0%) and other geographical areas: 112 (5.8%). The latter was composed almost entirely of Italians (n=100). Information on geographical provenance was missing for two patients.

The results of the comparison with patients seeking medical assistance in the same period of 2019 and with those seen from 7 January 2020 to the beginning of lockdown are presented further.

Lockdown versus same period of 2019

Though the reduction in the number of consultations during the lockdown (4154 vs 8212) was generalised, we focused on patients with three frequent chronic conditions: diabetes, cardiovascular diseases and psychiatric disorders. We evaluated the quantity and number of dispensations of medicines used in the treatment of these conditions. As specified previously, drugs were identified with their ATC code.

As shown in figure 2, we found that the number of dispensations was lower in 2020 for cardiovascular and psychiatric diseases, especially during the lockdown period (right part of the plots); on the contrary, dispensation of antidiabetic agents remained substantially unchanged. The dispensed quantity, measured as DDD/1000 patients, was also lower for cardiovascular and psychiatric diseases in 2020, especially during lockdown; again, this was not the case for diabetes (figure 3).

Splitting antidiabetic medications into insulins and oral antidiabetics, we noticed that a reduction in the dispensation of the latter (−18.9%) was compensated by an increased demand for the former (+26.4%).

All the changes described for the lockdown period, as compared with the same period of 2019, affected all ethnicities, with the exception of the small number of indigent Italians who had a reduction only of psychiatric patients seen at OSF. All age groups showed comparable trends, while females experienced a greater reduction in the number of patients in each NCD group (table 1).

Lockdown versus prelockdown period of 2020

These two periods had a different duration: 3 months for lockdown and 2 months for prelockdown. In spite of this, less patients were seen (1914 vs 2596) and less consultations were carried out (4154 vs 5569) during the lockdown. Again, we considered the medications used to treat the more common NCD. The weekly pattern for number of prescriptions and dispensed DDD/1000 patients is shown in figures 2 and 3 (dotted lines). A decrease during lockdown is evident in the number of prescriptions and number of DDD/1000 patients for psychiatric and cardiovascular diseases but less for diabetes.

As shown in table 2, the number of patients with cardiovascular diseases slightly decreased. Patients with diabetes showed a small increase. Patients with psychiatric disorders were greatly diminished.

Some differences were seen among different ethnic groups. The small group of indigent Italians showed no reduction in the number of patients with chronic conditions attending OSF, including those with psychiatric problems. On the contrary, they showed a general increase.

Female patients receiving medications for chronic conditions showed a greater reduction than males.
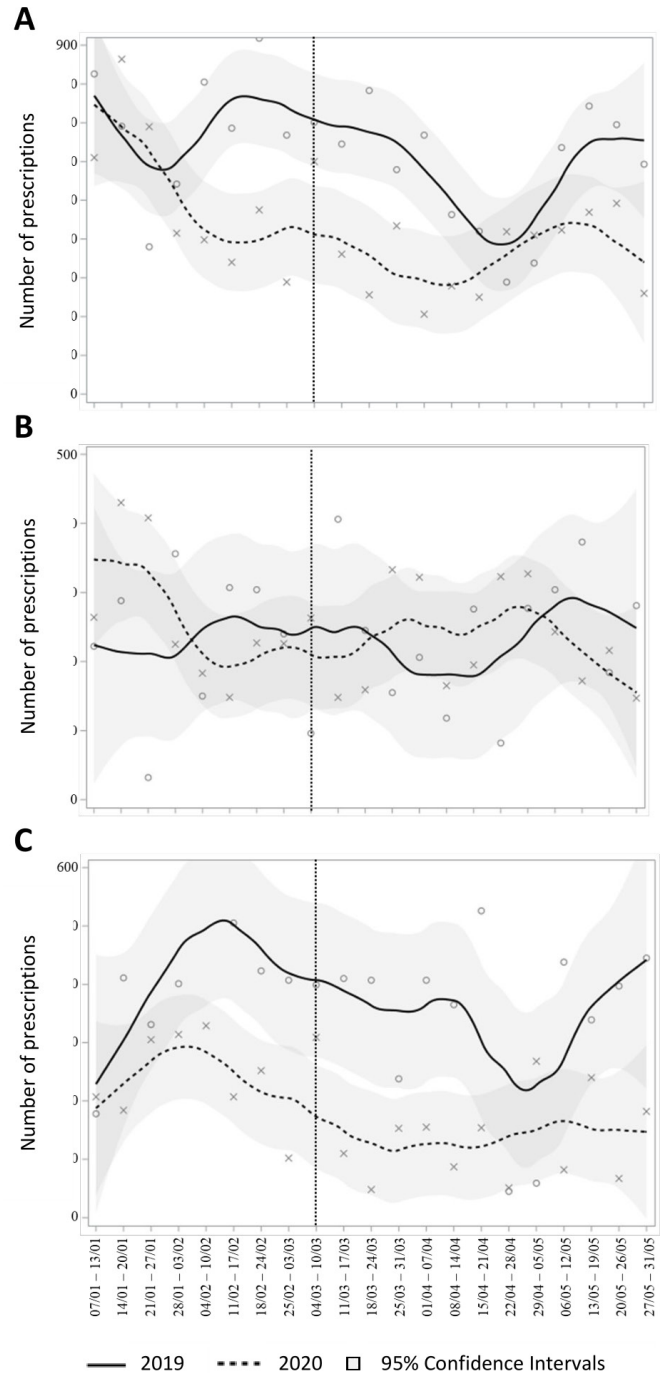
Figure 2 The figure shows the trend of prescriptions of cardiovascular (A), antidiabetic (B) and psychiatric (C) drugs by OSF during the period from 7 January 2019 to 31 May 2019 (solid line) and in the same period of 2020 (dotted line). The vertical line indicates the date the lockdown was imposed in Italy (ie,8 March 2020). Trends of the number of prescriptions were smoothed using the LOESS method, in order to remove seasonality and casual fluctuations over time. Circles and crosses represent the number of prescriptions observed in 2019 and in 2020, respectively. The grey areas represent 95% CIs. OSF.

DISCUSSION

This study describes the effects of SARS-CoV-2 pandemic and the consequent lockdown on a population of
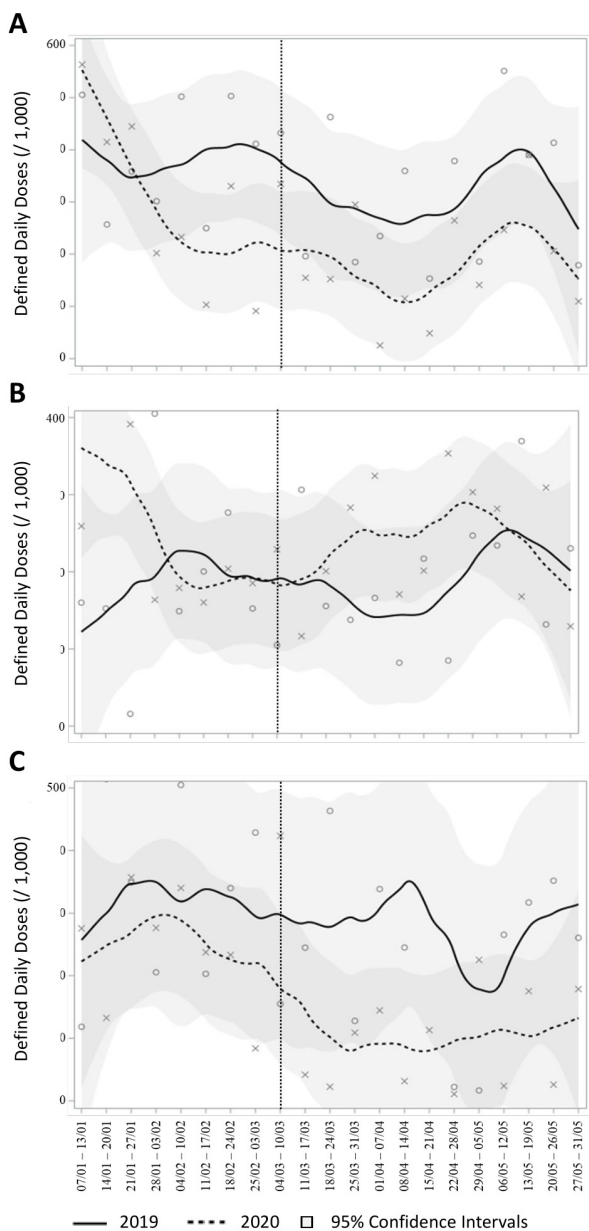
Figure 3 The figure shows the dispensed quantity (measured as total DDD/1000 patients) of cardiovascular (A), antidiabetic (B) and psychiatric (C) drugs during the period from 7 January 2019 to 31 May 2019 (solid line) and the same period in 2020 (dotted line). The vertical line indicates the date the lockdown was imposed in Italy (ie,8 March 2020). Trends of dispensed quantities were smoothed using the LOESS method, in order to remove seasonality and casual fluctuations over time. Circles and crosses represent the quantities observed in 2019 and in 2020, respectively. The grey areas represent 95% CIs.

undocumented migrants receiving medical assistance from an NGO in Milan, Italy. It has to be noticed that, unlike other NGO operating in the same area, OSF continued its activity regularly during the lockdown with not even 1 day of suspension. Therefore, our observations were not biased by periods of closure and shortages in medications supply.

However, we are aware that our study has some limitations.

First, we could not predetermine the magnitude of our sample, but we simply used all available data. Second, we cannot say which percentage our patients represent of all undocumented migrants living in Milan. Third, we had no means of contacting patients lost at follow-up; therefore, the reasons for this could only be inferred.

Even with these limitations, we try to make some considerations.

Our data show a generalised reduction in the number of patients requiring to be treated. The number of prescriptions was also reduced, as was the quantity (measured as DDD/1000 patients) of dispensed medications.

This was true also for patients with NCD, though it is known that undocumented migrants are frequently affected by these diseases.[27]

An exception appears to be represented by patients with diabetes, who did not show significant reductions. Indeed, their number and their need of pharmacological treatment increased during the lockdown period as compared with the first months of 2020. Though this can be due to the different length of the two periods, it should be considered that this did not happened with other NCD. Incidence and severity of COVID-19 could possibly be increased in patients with diabetes.[28 29] Awareness of this potential risk could have led diabetic undocumented migrants to a better adherence to therapy and follow-up. This interpretation is in keeping with our previous observation that undocumented migrants tend to be highly aware of their chronic diseases.[30]

In a general context, it has been noticed that COVID-19 pandemic had both negative[31] and positive[32] effects on lifestyle and consequently on glycaemic control of patients with diabetes. Positive effects could have been predominant in the population of our study, though we have no explanation for this.

Things went much worse with other NCD, especially psychiatric disorders. This is quite surprising since we know that these problems are not uncommon in undocumented migrants and more in general in the population cared for by OSF.[33]

Moreover, COVID-19 pandemic had multifaceted psychological implications, including an increased incidence of depressive symptoms.[7 34 35] Therefore, we would have expected a greater demand for psychiatric consultations and medicines during the period of quarantine. This has not been the case.

Since it is known that psychological disorders, also during the pandemic, were at least in part dependent from modifiable factors,[7 8] it is possible that some of these, as support from family and friends, had a role, at least in some groups of patients. Exposure to social media has also been shown to be a significant worsening factor, especially for anxiety.[36] A part of our patients is homeless, while the vast majority live in overcrowded households. In both cases, the intensive use of electronic devices is impossible. Moreover, the vast majority of them has no

Table 1 Number of patients prescribed a medication for cardiovascular diseases, diabetes and psychiatric disorders in the lockdown period (8 March 2020 to 31 May 2020) and in the same period of 2019, stratified by sex, age and ethnicity

	Cardiovascular			Diabetes			Psychiatric		
	2019	2020	% variation	2019	2020	% variation	2019	2020	% variation
Age (years)									
0–17	1	0	−100	0	1		0	0	0
18–64	349	254	−27	126	114	−10	217	145	−33
≥65	96	68	−29	27	23	−15	32	11	−66
Sex									
Female	243	159	−35	73	63	−14	148	85	−43
Male	203	163	−20	80	75	−6	101	71	−30
Ethnicity									
Mediterranean Africa	42	35	−17	18	19	6	19	13	−32
Sub-Saharan Africa	35	17	−51	10	5	−50	28	18	−36
Latin America	167	116	−31	63	48	−24	98	61	−38
Asia	40	35	−13	19	22	16	19	17	−11
Eastern Europe	145	101	−30	39	39	0	55	26	−53
Italy	13	14	12	2	3	50	26	18	−35
Other/missing	4	4	0	2	2	0	4	3	−25
Total	446	322	−28	153	138	−10	249	156	−37

hardware enabling them to stay connected for long periods. The only exception is the mobile phone, but also this is very frequently outdated. Therefore, patients attending OSF were undoubtedly less exposed to social media. This might have contributed to reduce their anxiety and their need for anxiolytic medications.

Patients with cardiovascular problems experienced a minor reduction in the lockdown period as compared with the prelockdown months of 2020, though they showed a great reduction between the same months of 2019 and 2020. The latter can be an expression of the great variability of this unstable population. The former is

Table 2 Number of patients prescribed a medication for cardiovascular diseases, diabetes and psychiatric disorders in the lockdown period (8 March 2020 to 31 May 2020) and in the prelockdown period (7 January 2020 to 7 March 2020), stratified by sex, age and ethnicity

	Cardiovascular			Antidiabetic			Psychiatric		
	Prelockdown	Lockdown	% variation	Prelockdown	Lockdown	% variation	Prelockdown	Lockdown	% variation
Age (years)									
0–17	0	0	0	2	1	−50	0	0	0
18–64	245	254	4	89	114	28	186	145	−22
≥65	86	68	−21	31	23	−26	20	11	−45
Sex									
Female	175	159	−9	57	63	11	129	85	−34
Male	156	163	4	65	75	15	77	71	−8
Ethnicity									
Mediterranean Africa	24	35	46	16	19	19	16	13	−19
Sub-Saharan Africa	14	17	21	6	5	−17	18	18	0
Latin America	132	116	−12	53	48	−9	88	61	−31
Asia	35	35	0	11	22	100	14	17	21
Eastern Europe	107	101	−6	32	39	22	49	26	−47
Italy	11	14	27	2	3	50	17	18	6
Other/missing	8	4	−50	2	2	0	4	3	−25
Total	331	322	−3	122	138	13	206	156	−24

more difficult to explain but is in line with the reduction in cardiovascular diagnoses in the general population during the same period.[18 37] Moreover, a part of patients in the cardiovascular group were patients with arterial hypertension. Therefore, it is possible that, in the absence of symptoms, some of them have suspended treatments and consultations.

Though we know that during COVID-19 pandemic all patients with NCD experienced reduced medical assistance,[16 38] we do not know exactly why undocumented migrants reduced consultations and requests of medicines during the lockdown. The considerations made previously could explain this trend which, with the exception of diabetes, has been generalised, but we cannot be sure that they are the only ones. Moreover, it is interesting to note that indigent Italians were less involved. Though they were quite few, we noticed that their number increased during lockdown, with the only exception of patient with psychiatric disorders, who were less than in the same months of 2019. This is interesting since we observed that, among the poor, awareness of diseases is not higher in natives than in migrants.[30] A different explanation has to be looked for. However, the number of indigent Italians in the present study was so small that it does not allow to draw any conclusion.

We must take into account that undocumented migrants might have been kept away from medical assistance for different reasons. In general, disadvantaged segments of population face more difficulties in accessing usual forms of care.[39 40] In the case of undocumented migrants, these barriers are usually related to law and policy, but this is surely not the case with OSF. However, recently arrived immigrants, not knowing the real situation, could have been discouraged by this sort of feeling. More likely, the need to break containment rules to access the outpatient clinic could have acted as a deterrent, since being identified as undocumented puts a person at risk of being expelled. This can also explain the different behaviour of undocumented migrants and natives. On the contrary, it does not explain why undocumented migrants with diabetes continued to access the outpatient clinics of OSF, while those with other NCDs showed a great reduction.

Another interesting fact is that the decrease of the number of female patients accessing OSF outpatient clinics was greater than that of males. This is another observation that is difficult to explain, especially considering that females could be more susceptible than males to some health problems as, for example, psychological disorders.[41 42] Though it has been suggested that gender discrimination can increase during lockdown,[43] this seems hardly the only explanation of the difference we found between female and male patients.

Taken together, our findings seem to suggest that a greater involvement of health authorities in taking care of the more indigent segments of our population is necessary.

To work in this direction, a good knowledge of the health needs of these persons is an inevitable first step.

The method we describe in this study can be useful, but it is far from being exhaustive. Moreover, it can be used only with relatively small groups of patients, such as those attending charitable facilities.

Further investigation should evaluate other methods of getting the information we need.

One could be the use of questionnaires. Of course, mail questionnaires are impossible with this type of patients, and also telephone interviews show many difficulties. On the contrary, questionnaires administered directly on site, before or after consultations, seem to be a promising tool.

They could be administered to different groups of patients attending different charities and so it could be possible to get more comprehensive information on their needs. This seems worth to be investigated.

Telemedicine is probably an even more promising tool. During the COVID-19 outbreak, it has been successfully used, for example, with neurological patients.[44] This system has been demonstrated to be accessible and reliable.[45] In its basic form, it can at least transmit basic life parameters, which is essential to escalate the level of care.[46] Therefore, for patients like those described in this study, it could be used to get information and to send instructions or even to locate patients needing emergency interventions. It is true that with so unstable and indigent persons, we can expect many difficulties in its implementation. However, it seems to be a valuable and affordable strategy,[47] and it is definitely worth to be further investigated. As mentioned previously, these persons usually have a mobile phone, so the first subject of research could be its use to implement some form of telemedicine.

This type of studies can really help to know more accurately the health needs of these patients and to offer them a better assistance, while we wait for a more inclusive assistance for all the persons who need it, in spite of their administrative status.

CONCLUSION

In the present study, we show that undocumented migrants living in a Western country changed their way to use healthcare facilities offered by an NGO during the lockdown period. This change was uneven. Patients with different chronic conditions behave differently: a significant decrease in the number of consultations and medicine dispensations was seen for patients with mental disturbances, while no relevant change was noticed for patients with diabetes. Females suffered a greater reduction than males.

It is also possible that undocumented migrants and natives in the same conditions of poverty had to face different barriers to access free healthcare services.

Now we feel that recovery is at hand, and authoritative speakers have underlined the need for it to be an equitable one at a global level.[48] Which will be the consequences if it is not equitable even at a local level?

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