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Brief Report

Impact of the lockdown on the burden of COVID-19 in outpatient care in France, spring 2020

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Abstract

Background

To limit the spread of SARS-CoV-2 several countries implemented measures to reduce the number of contacts such as national lockdown. We estimated the impact of the first lockdown on the burden of COVID-19 in the community in France.

Methods

Physicians participating in the French Sentinelles network reported the number of patients with acute respiratory infection (ARI) seen in consultation and performed nasopharyngeal swabs in a sample of these patients (first patient of the week). The swabs were tested by RT-PCR for the presence of SARS-CoV-2. Clinical and virological data was combined to estimate ARI incidence attributable to SARS-CoV-2 from March 17 to May 10, 2020.

Results

The incidence of ARI attributable to COVID-19 decreased after the second week of the lockdown period from 142 (95%CI [101;183]) to 41 (95%CI [21;60]) per 100 000 population. A decrease was observed in all areas in metropolitan France. The youngest age groups (< 15 years old) were least affected with a cumulated incidence estimated to 14 per 100 000 population during the study period.

Conclusions

The data collected in primary care suggests that the first lockdown implemented in France during spring 2020 significantly reduced the incidence of acute respiratory infections including COVID-19 in France and limited the geographic spread of SARS-CoV-2.

Introduction

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in China in December 2019 and spread globally. The first case of the Coronavirus disease 2019 (COVID-19) in Europe was identified on January 24, 2020 in France [1,2]. Transmission of SARS-CoV-2 was then observed in the community, leading to a rapid increase of the number of cases including severe and fatal cases [3,4].

Monitoring of COVID-19 in the community often uses the number of individuals testing positive for SARS-CoV-2 [5]. Following the rapid dissemination of the pandemic in the population and the inability to test each suspected case, illness indicators at a population-wide level have been implemented [6,7]. Existing surveillance systems in primary care designed for seasonal influenza surveillance are a valuable already operational resource. In France, the Sentinelles network has been adapted from influenza to COVID-19 surveillance since March 17, 2020.

To reduce spread of SARS-CoV-2, many countries implemented measures of social distancing, closure of schools and work offices, following the measures adopted in China [8]. In France, the first lockdown was implemented on March 17, 2020 for 8 weeks. By drastically reducing the number of contacts between individuals, the number of people infected was expected to decrease in order to avoid over-burdening of critical care [9]. However, this decrease was assessed only by modeling in hospital settings [10,11].

The aim of our study was to estimate the impact of the lockdown on the burden of COVID-19 in the community in France in terms of the number of new cases and geographical spread using the data collected by the French surveillance network in primary care.

Materials and methods

Surveillance of COVID-19 in primary care

Since 1984, the Sentinelles network monitors influenza in France from data collected by general practitioners (GPs) and pediatricians all over France [12]. Starting from the spread of SARS-CoV-2 in

the community, influenza surveillance was switched to COVID-19 surveillance on March 17, 2020. Following the recommendations [7,13], COVID-19 surveillance was based on a case definition of acute respiratory infection (ARI): sudden onset of fever (or feeling of fever) and respiratory signs. Participating GPs were invited to report patients with ARI seen in both office and telehealth visits because physician practices turned to telehealth to limit contacts [14].

Along with this clinical surveillance, physicians collect nasopharyngeal swabs from the first patient of the week presenting with ARI (GPs collect an additional swab from the first patient aged 65 years and older with ARI) [15]. RT-PCR tests for detection of SARS-CoV-2 were performed by the National Reference Centre for respiratory viruses (Paris and Lyon) and the Laboratory of virology at the University of Corsica.

All epidemiological and virological data collected from the beginning of the COVID-19 surveillance (March 17, 2020) to the end of the first lockdown period (May 10, 2020) were considered in this study.

Incidence estimation

Incidence of ARI was estimated using the methodology described elsewhere for incidence of influenza-like illness (ILI) [16]. To sum up, the mean number of reported patients presenting with ARI per sentinel GP for a given week is multiplied by the total number of practicing GPs in France. Incidence rates (per 100,000 population) were estimated by dividing incidences by yearly population size (census data).

Incidence of ARI attributable to COVID-19 was estimated by combining ARI incidence and virological data: ARI incidence was multiplied by the SARS-CoV-2 positivity rate of a given week [6]. To account for differences in attack rates by age and place, estimates were stratified by age groups (<15 years, 15-64 years, 65 years and older) and geographical areas (5 areas: Northwest, Southwest, Southeast, Northeast and Paris area - Île-de-France).

Geographical spread of COVID-19 over the study period was assessed using the "kriging" method applied on weekly ARI incidence estimated at departmental level (96 departments in metropolitan France) [17]. The number of nasopharyngeal swabs collected do not allow the estimation of ARI incidences attributable to COVID-19 at a fine spatial scale.

Ethics approval

The protocol was approved by the French Data Protection Agency (CNIL#471393) and the French ethics research committee ("*Comité de Protection des Personnes*"). Oral consent was obtained from swabbed patients.

Results

From March 17 to May 10, 2020, 465 GPs and 45 pediatricians participated in the surveillance. The GPs reported 6 752 ARI cases. A total of 575 swabs were collected. Sixty-two (10.8%) were positive for SARS-CoV-2. The positivity rate was higher at the beginning of the study period: 15% (22/148) were positive for SARS-CoV-2 in week 12 and 19% (25/129) in week 13 (Table 1).

The incidence of ARI attributable to COVID-19 increased between week 12 and week 13, from 78 per 100 000 population (95%CI [54;102]) to 142 per 100 000 population (95%CI [101;183]). After the incidence peak in week 13, the incidence decreased by -71% between week 13 and week 14, and by -90% between week 14 and week 15. The incidence was stabile from week 15 (Figure 1, Table 1).

The lowest incidence was found in persons below 15 years of age and the middle age group had the highest incidence (Figure 1). In persons younger than 15 years, only two specimens of 114 (1.8%) were positive for SARS-CoV-2 over the study period while 20% (18/92) of swabs collected from those aged 65 years and above were positive.

The two most afflicted areas were Paris (Ile-de-France) and the Northeast, accounting for 75% of the incidence over the study period (Figure 2). Declining incidence was observed in all the five areas over

the period with an incidence peak in week 13, except for the Southwest area where the highest incidence was observed in week 12.

The spatial spread of ARI incidences over the period is reported using the "kriging" method (Figure 2c). Between week 12 and week 19, the six maps showed a similar spatial distribution without indication of spatial spread over time.

Discussion

The spread of SARS-CoV-2 in France and the COVID-19 morbidity and mortality led the French authorities to impose a national lockdown during the spring of 2020. We found that this lockdown significantly reduced the incidence of acute respiratory infections including COVID-19 in France and limited the geographic spread of SARS-CoV-2.

The expected impact of a lockdown is a decrease in the number on new cases due to reduction of contacts. Other studies in France and other European countries showed a decrease using data collected at hospital level [10,11,18–20]. No studies have reported the burden of the COVID-19 pandemic in primary care, although the majority of infected patients have mild disease and are not seen in hospitals. We observed a decrease in incidence after the second week of the lockdown. This lag of two weeks is compatible with the generation time of COVID-19 [21,22]. In addition, the decrease in COVID-19 and ARI incidences was synchronous in all five areas, as also reported at the hospital level [23]. This suggests that the lockdown had a major impact by reducing the number of new cases of COVID-19 in outpatient care. The observed decrease of global ARI incidence also suggests that lockdown strategies are effective to limit the spreading of common respiratory pathogens, as observed in other countries [24,25].

The two most afflicted areas in France were Paris (Ile-de-France) and the Northeast accounting for three quarters of the ARI incidence attributable to COVID-19 over the period. This is consistent with the intense activity observed at hospital level in these regions early in 2020 [23] and the higher prevalence of SARS-CoV-2 antibodies estimated in Ile-de-France and the Northeast after the

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lockdown [26]. We also observed that clusters with high ARI incidence were spatially contained over time. These observations suggest that travel ban during the lockdown effectively limited the spread of SARS-CoV-2 from one region to another, which is consistent with results in China [9].

Our study has several limitations. We estimated the number of COVID-19 patients presenting with ARI in primary care, excluding asymptomatic patients and patients with other clinical presentations, as well as patients who did not see a GP. However, in the French crowdsourced surveillance system GrippeNet.fr, no large variations in health-seeking behavior of people presenting with ARI were reported during the study period [27]. In addition, the lockdown made the collection of nasopharyngeal swabs difficult due to increased teleconsultations and major disturbances in the postal service. Finally, we could not identify all pathogens responsible of the respiratory infections during the study period, as the swabs were not routinely tested for other respiratory viruses than SARS-CoV-2 during this period.

Conclusion

The surveillance system in primary care allowed monitoring of the spread of COVID-19 in the community and measurement of the impact of public health interventions. The first national lockdown may have contributed considerably to the decline of new cases of COVID-19 early in 2020. Public health interventions, including testing, tracing and isolation, need to be continued to keep transmission of SARS-CoV-2 under control.

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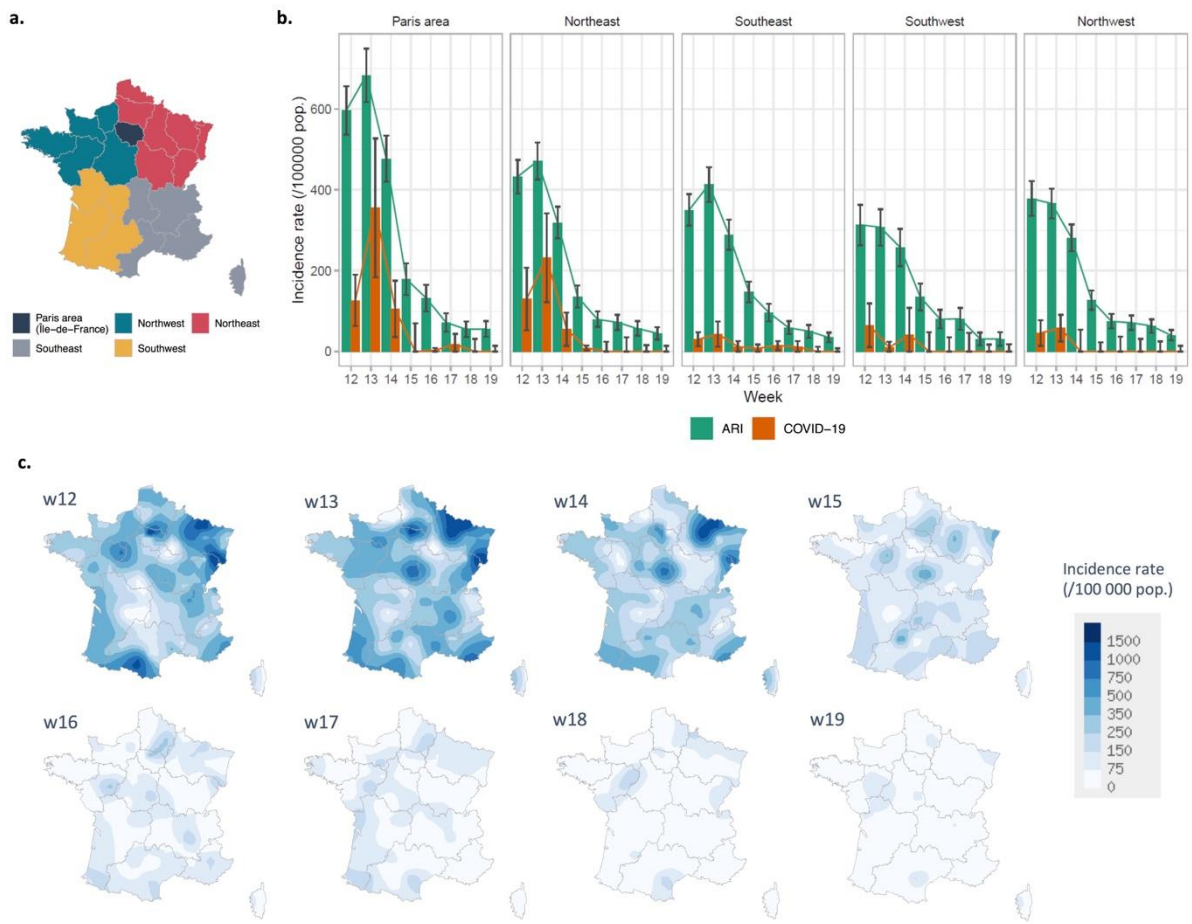
Table

Table 1. Incidence of acute respiratory infection and acute respiratory infection attributable to COVID-19 with 95% confidence intervals, and positivity rates of nasopharyngeal swabs to SARS-CoV-2, week 12 to week 19, 2020, France.

Age groups	Weeks	Percentage of specimens tested positive to SARS-CoV-2	ARI incidence (per 100 000 population) [95% CI]	ARI incidence attributable to COVID-19 (per 100 000 population) [95% CI]
Overall	Week 12	15% (22/148)	415 [394;436]	78 [54;102]
	Week 13	19% (25/129)	452 [430;474]	142 [101;183]
	Week 14	8% (7/90)	325 [306;344]	41 [21;60]
	Week 15	5% (3/65)	145 [132;158]	4 [1;7]
	Week 16	8% (3/40)	93 [83;103]	4 [1;7]
	Week 17	8% (2/26)	70 [61;79]	6 [0;12]
	Week 18	0% (0/34)	53 [45;61]	0 [0;5]
	Week 19	0% (0/42)	42 [35;49]	0 [0;4]
< 15 years	Week 12	0% (0/32)	315 [272;358]	0 [0;34]
	Week 13	3% (1/29)	203 [168;238]	11 [0;30]
	Week 14	0% (0/20)	137 [108;166]	0 [0;22]
	Week 15	0% (0/11)	52 [33;71]	0 [0;13]
	Week 16	7% (1/14)	39 [23;55]	3 [0;9]
	Week 17	0% (0/8)	32 [18;46]	0 [0;10]
	Week 18	0% (0/12)	22 [10;34]	0 [0;5]
	Week 19	0% (0/18)	21 [9;33]	0 [0;4]
15- 64 years	Week 12	17% (15/88)	512 [482;542]	107 [70;144]
	Week 13	22% (16/74)	589 [558;620]	202 [138;266]
	Week 14	10% (6/59)	429 [401;457]	49 [19;79]
	Week 15	2% (1/41)	182 [163;201]	3 [0;7]
	Week 16	9% (2/22)	116 [101;131]	6 [1;11]
	Week 17	13% (2/16)	86 [73;99]	10 [0;20]
	Week 18	0% (0/18)	65 [54;76]	0 [0;11]
	Week 19	0% (0/19)	50 [40;60]	0 [0;8]
>= 65 years	Week 12	25% (7/28)	236 [201;271]	66 [28;104]
	Week 13	31% (8/26)	287 [249;325]	84 [40;127]
	Week 14	9% (1/11)	195 [162;228]	53 [13;94]
	Week 15	15% (2/13)	123 [96;150]	10 [3;17]
	Week 16	0% (0/3)	77 [56;98]	0 [0;43]
	Week 17	0% (0/2)	59 [41;77]	0 [0;39]
	Week 18	0% (0/4)	45 [29;61]	0 [0;22]
	Week 19	0% (0/5)	35 [21;49]	0 [0;15]

Figures
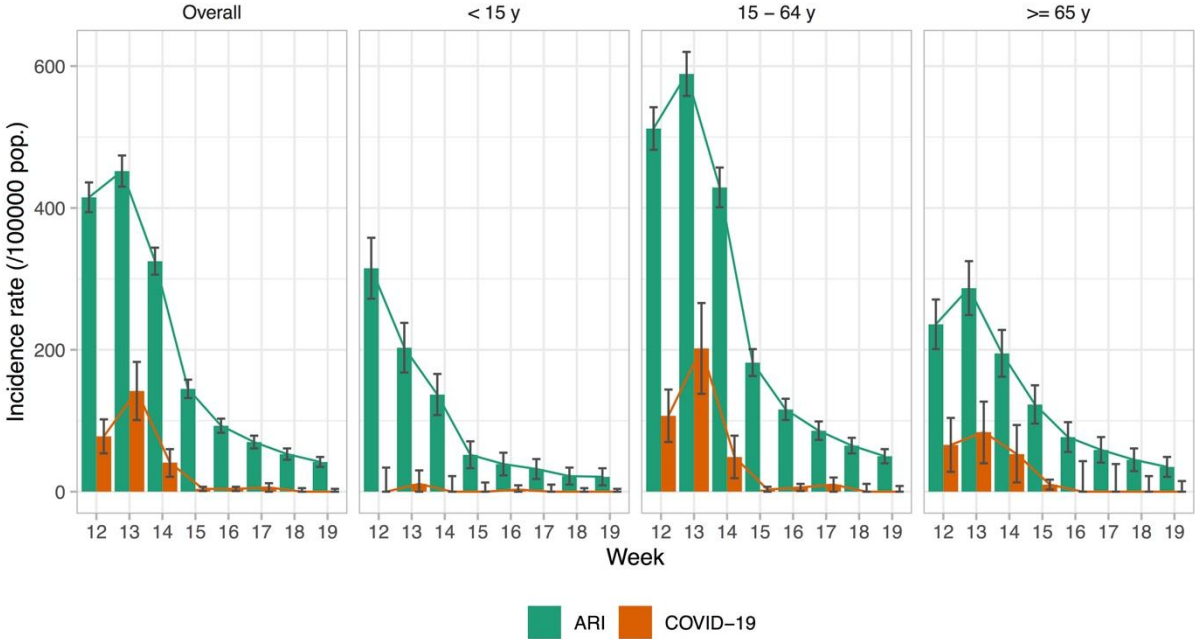
Figure 1. Incidence rate estimates (and 95% confidence intervals) of acute respiratory infection and acute respiratory infection attributable to COVID-19 according to age groups, weeks 12 to 19, 2020, France

Figure 2. Incidence rates estimated by geographical areas weeks 12 to 19, 2020, France (a) Geographical distribution of the five areas in France, (b) Incidence (and 95% confidence intervals) of acute respiratory infection and acute respiratory infection attributable to COVID-19 in five geographical areas, (c) incidence of acute respiratory infections estimated through the "kriging" method.