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Short communication

Screening around a COVID-19 cluster: Exploring its impact on a local virus outbreak



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ABSTRACT

Objective: In March 2020, we implemented screening of the contacts of a COVID-19 cluster having occurred in the Lot-et-Garonne department, the first department of the Nouvelle-Aquitaine region to be affected by the active circulation of SARS-CoV-2. We aimed to describe the impact of this screening on the local SARS-CoV-2 outbreak.

Methods: All high-risk contacts, as well as the individuals living in their households, were screened. We detailed the evolution of the number of confirmed COVID-19 cases in the Lot-et-Garonne department and the rest of the Nouvelle-Aquitaine region.

Results: Among the 89 screened individuals, 10 new cases were confirmed, including 4 asymptomatic persons. In Lot-et-Garonne, the number of confirmed COVID-19 cases immediately decreased after this screening and no epidemic peak occurred, contrary to what was observed in the rest of the region.

Conclusion: The early screening of high-risk contacts of COVID-19 cases and members of their household implemented a few days before the first lockdown probably helped to prevent the spread of the virus in the department.

1. Introduction

The first European case of COVID-19 was declared on 24 January 2020 in the Nouvelle-Aquitaine region of southwestern France [1]. The individual had returned from the Wuhan region of China, which is where the SARS-CoV-2 virus emerged in December 2019 [2,3]. In late February 2020 in France, an outbreak of SARS-CoV-2 infections was identified in the Grand-Est region, where numerous infected individuals had participated in a religious gathering near Mulhouse from 17 to 22 February, bringing together more than 2000 people from all over the country.

In the Nouvelle-Aquitaine region, 71 new cases of COVID-19 were identified between 28 February and 10 March 2020, with 24 residing in the Lot-et-Garonne department. The majority of infected individuals lived in a limited geographical area near Agen, the main city of the department, and were directly or indirectly linked to the confirmed COVID-19 cases from the religious community that participated in the Mulhouse gathering [4,5]. After identifying this

cluster with transmission beyond the community, contact screening was performed to limit the spread of the virus.

This study presents the results of screening around a COVID-19 cluster and its impact on the local dynamics of SARS-CoV-2 circulation.

2. Methods

2.1. Definition of cases

A confirmed case linked to the cluster was defined as any individual with a positive test for SARS-CoV-2 infection confirmed by reverse transcription polymerase chain reaction (RT-PCR) and a link to a confirmed COVID-19 case who belonged to a religious community of Agen and had participated in the religious gathering in Mulhouse.

2.2. Contact tracing

In accordance with the guidelines effective in March 2020, each confirmed case was investigated using a questionnaire collecting data on their clinical signs, risk exposure, and contacts 24 h prior

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Table 1
Definition of a contact by level of risk of SARS-CoV-2 infection, March 2020, France.

Level of risk of infection	Contact definition
High risk	Person shared the same place with a confirmed case (family, same hospital room, etc.); flirting; close friends; class or office neighbours; neighbours of the index case in an airplane or train, in the absence of effective protection measures
Low risk	Person who had prolonged (> 15 min) direct face-to-face contact (< 1 m) with a confirmed case
Negligible	Person who had occasional contact with a confirmed case during frequentation of public places

to the onset of symptoms [6]. Each contact was evaluated as high, low, or negligible risk (Table 1). High- and low-risk contacts were called upon by the health authorities to provide recommendations [7].

2.3. Screening

All high-risk contacts, as well as the individuals living in their household, whether symptomatic or not, were screened by the regional health agency (ARS) in collaboration with the Agen-Nérac public hospital.

This screening was organised on 11 and 12 March 2020, with mobile teams of health professionals taking samples at the contacts' homes. The characteristics of the screened individuals were collected on a form during the screening. RT-PCR analyses for SARS-CoV-2 were conducted in the virology laboratory of Bordeaux University Hospital.

2.4. Impact of screening

The evolution of confirmed COVID-19 cases and overall incidence in the Lot-et-Garonne department and the Nouvelle-Aquitaine region was reported for the period from 1 March to 12 April.

2.5. Personal data protection

The study was based on data collected directly from the data subject and from health professionals in the context of a survey conducted by *Santé publique France* in accordance with its legal missions and prerogatives regarding medical secrecy (L. 1413-1, L.1413-8 and L. 1413-12-3 public health code). In 2011, *Santé publique France* was granted general authorization by the French data protection authority to carry out relevant data processing. In 2020, the French data protection law (Law n°78-17 of 06/01/1978 and Decree n°2019-536 of 29/05/2019) was amended to allow *Santé publique France* to carry out any type of data processing necessary to respond to health alerts in a timely manner.

3. Results

3.1. Cluster characteristics and screening

On 10 March, a cluster of 24 confirmed COVID-19 cases was identified, including 11 members of the same religious community and 13 cases with a direct or indirect link to its members. Among the 24 cases, 4 had participated in the religious gathering in Mulhouse from 17 to 22 February.

All in all, 22 cases lived in the same geographical area, near the city of Agen in the French Lot-et-Garonne department.

Contact tracing of the 22 cases resulted in the identification of 88 contacts residing in the same geographical area as the cluster. Some of the contacts were common to several cases. These contacts and members of their households were subsequently screened, representing 103 individuals in 38 households.

Among the 103 individuals identified for screening, 95 were tested for SARS-CoV-2: 89 were screened for the first time, while 6 had already been tested positive by RT-PCR on 10 March. The 8 individuals identified for screening but not tested had been tested previously; among them, 7 were found positive and one negative. Patient characteristics were collected for 55 screened individuals only. Among them, 31 (56.4%) were men, 18 (32.7%) were children under 18 years, 28 (51.0%) were aged 18–44 years, 8 (14.5%) were aged 45–64 years, and one (1.8%) was aged over 65 years.

Among the 89 newly screened individuals, 10 new cases were confirmed (positive test rate: 11%). They comprised 4 children aged under 18 years and 6 adults. They belonged to 7 different households, 4 of which had no known confirmed case prior to screening (Fig. 1).

Of the 10 identified cases, only 6 persons presented clinical signs; in 2 cases, they developed on the day of screening.

These 10 cases were infected by 5 individuals related to the cluster that led to the screening. Each of these 5 persons contaminated between one and 4 contacts (2 in average). As regards the newly detected cases, no further contact was identified, and no additional related case was reported.

Following this organised screening, 6 other cases related to the cluster from Lot-et-Garonne were reported between 11 and 15 March; 4 of them had been tested previously.

Between 4 and 15 March, 40 cases belonging to this cluster were reported, including 38 cases in Lot-et-Garonne. Among them, 7 cases (17.5%) were asymptomatic at the time of the investigation, including 4 children aged 5 and 7 years.

3.2. Dynamic of the local outbreak

A total of 120 cases were subsequently diagnosed in Lot-et-Garonne from 4 March to 12 April. After a rapid increase in the number of cases between 6 and 9 March followed by the implementation of screening, the number of cases initially decreased and subsequently remained stable.

Lot-et-Garonne had the highest daily incidence of COVID-19 cases in the Nouvelle-Aquitaine region until March 18; i.e. 7 days after the screening around the cluster and one day after the start of the national lockdown in France (March 17). Thereafter, incidence of COVID-19 cases in Lot-et-Garonne became – and remained – lower than in the rest of the region (Fig. 2).

In the region, the first epidemic peak was observed on 27 March and the second on 11 April (associated with the introduction of screening in nursing homes), whereas no increase occurred in the Lot-et-Garonne department.

4. Discussion

In the Nouvelle-Aquitaine region, Lot-et-Garonne was the first department affected by the active circulation of SARS-CoV-2 and had the highest incidence of COVID-19 cases in the region by mid-March, partially due to a cluster within a religious community. Screening around this cluster allowed us to identify 10 new cases and in all likelihood prevent the spread of the virus within the community and the department. In any event, the evolution of the number of confirmed COVID-19 cases reported in Lot-et-Garonne immediately decreased and remained stable until 12 April. Moreover, contrary to what was observed in the rest of the region in late March, no epidemic peak occurred in the department.

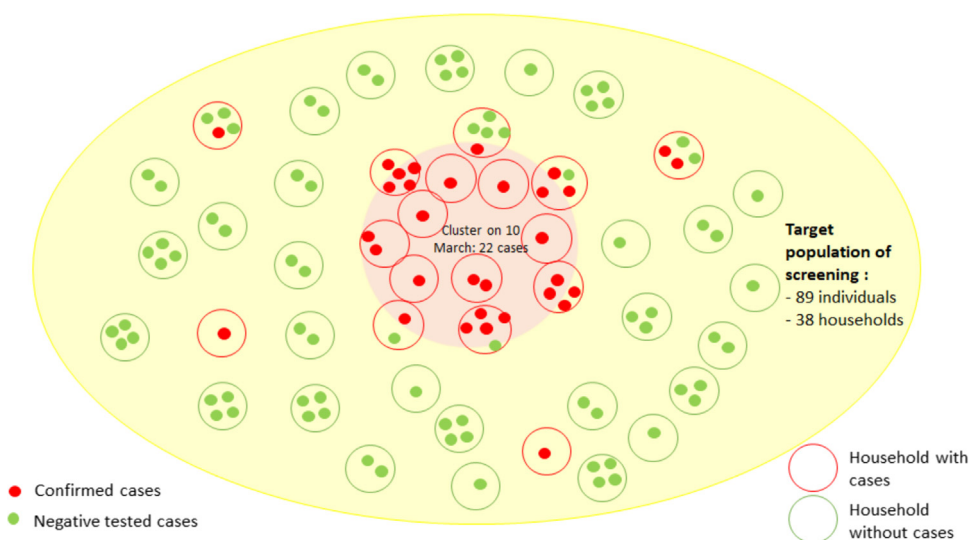


Fig. 1. Screening around the cluster (n = 89).

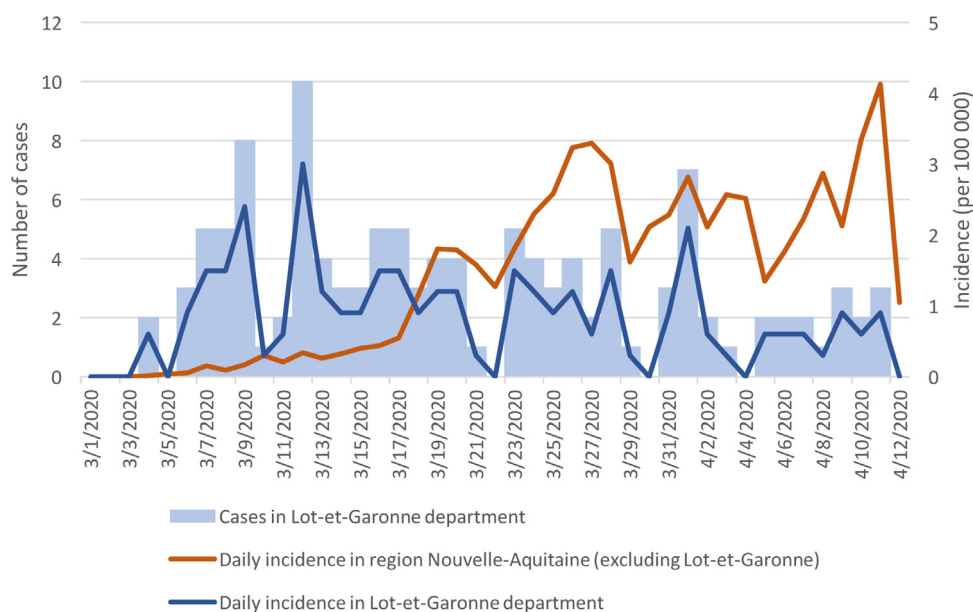


Fig. 2. Evolution of the number of confirmed COVID-19 cases in the Lot-et-Garonne department, daily incidence of COVID-19 cases in the Lot-et-Garonne department and the Nouvelle-Aquitaine region (excluding Lot-et-Garonne) from 1 March to 12 April 2020. Source: Virology laboratories reporting to the National Health Agency in Nouvelle-Aquitaine.

By 12 April, the incidence of COVID-19 cases in Lot-et-Garonne was the lowest in the region, reflecting low viral circulation in the department. Based on the results reported by virology laboratories, this trend is consistent with all the other epidemiological indicators available at the departmental level [8].

Of the 10 identified cases, 4 were asymptomatic; it bears mentioning that virus transmission through asymptomatic cases has been reported in various publications [9,10].

In our department, the rapid screening of contacts and their households helped to slow transmission of the virus within the cluster. In point of fact, no other cases linked with individual screening were detected.

Between 4 and 15 March, following the contact tracing of cases and the screening of contacts and their households, an additional 40 cases were identified within this cluster, including 7 asymptomatic individuals (17.5%). The proportion of asymptomatic individuals

infected by SARS-CoV-2 is comparable to that reported in other investigations of clusters [11–13].

Considering only the cases identified through organised screening, the proportion of asymptomatic cases was much higher than that observed in the overall cluster (40.0% vs. 17.5%); that said, given the limited number of cases, these results should be interpreted with caution.

More generally, following the identification of a COVID-19 cluster by contact tracing, the screening of high-risk contacts and members of their household should be strongly encouraged, the objective being to limit propagation of the virus. Indeed, expanded screening of COVID-19 cases appears in this respect to be an effective strategy [14]. It has been implemented in different countries to supplement other measures and proven to be effective [15].

In France, since the end of the first lockdown (11 May 2020), social distancing has been complemented by a screening strategy

designed to identify contacts of at-risk individuals, whether symptomatic or not, in view of breaking the transmission chains.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the 1964 Helsinki declaration and its later amendments.

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Authors' contributions

All authors attest that they meet the current International committee of medical journal editors (ICMJE) criteria for authorship. G.G. and L.F. wrote the first draft of the manuscript. O.M. and H.R. were involved in the epidemiological investigation and contact-tracing activities. D.H., G.C. and P.R. were involved in the screening organisation. M.E.L. performed the microbiological analysis. All of the authors revised and approved the manuscript.

Disclosure of interest

The authors declare that they have no competing interest.

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