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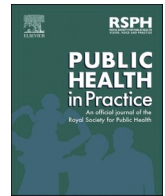
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## Short Communication

## SARS-CoV-2 rapid serological tests for field-based healthcare workers in homeless communities: A mixed-methods exploratory analysis

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## ABSTRACT

**Objectives:** The high risk of SARS-CoV-2 transmission in homeless communities requires adapted prevention strategies for field-based healthcare workers (HCWs). Rapid serological tests (RSTs) could be an invaluable tool for HCWs to control COVID-19 transmission. This study assesses the benefits of RSTs for HCWs in Marseille, France.

**Study design:** Mixed-methods exploratory analysis.

**Methods:** A mixed-methods approach was used, combining quantitative and qualitative data, to prospectively analyse acceptability of RSTs, prevalence of SARS-CoV-2 antibodies and prevention behaviours in 106 HCWs from 18 non-governmental organisations (NGOs) and health or social institutions in Marseille from June 1 to July 31, 2020. For the qualitative dimension, semi-structured individual interviews were conducted with 21 HCWs from 7 of 18 NGOs and institutions.

**Results:** Most of the 106 HCWs in the quantitative study reported better prevention measures at work than in their homes. Despite this, the majority reported that they felt unsafe at work in terms of COVID-19 infection risk. SARS-CoV-2 antibody seroprevalence among the study population was 6.1%. Only four HCWs refused to have an RST.

The 21 qualitative interviews highlighted that HCWs were not afraid of RSTs or of any possible stigma associated with a positive serological status, although they were sometimes suspicious about RST validity. Downplaying their risk of infection was a coping strategy to keep both a sense of control and remain motivated at work.

**Conclusions:** RSTs should be adopted as an additional tool in the strategy to protect both HCWs and healthcare service users. Additional follow-up of these observational findings is needed, especially with the increasing prevalence of vaccination in HCWs.

### 1. Background

Coronavirus disease 2019 (COVID-19) diagnosis is based on the detection of the SARS-CoV-2 virus using RT-PCR from naso-pharyngeal samples taken during active infection [1]. Rapid serological tests (RSTs), which detect SARS-CoV-2 antibodies, provide a fast diagnosis of past or recent infection, without having to send samples to centralised

laboratories. Most people infected with SARS-CoV-2 develop antibodies, even asymptomatic individuals [2]. RSTs require only finger-prick blood samples. Homeless people and field-based healthcare workers (HCWs) working with this vulnerable population have a particularly high risk of COVID-19 infection [3,4]. A rapid and easy serological test could aid HCWs in early decision making for themselves and their patients, which, when combined with other tools, may help prevent SARS-CoV-2

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transmission. COVID-19 self-testing could help to increase access to and coverage of SARS-CoV-2 testing, thus contributing to improved protection measures. To the best of our knowledge, this is the first study to evaluate the acceptability of RSTs for SARS-CoV-2, measure the prevalence of SARS-CoV-2 antibodies in HCWs through RSTs performed in the field (before access to vaccination) and describe prevention behaviours in field-based HCWs working with homeless communities in Marseille, France.

## 2. Methods

We used a mixed-methods approach to assess acceptability of RSTs, SARS-CoV-2 antibody status and prevention behaviours in HCWs from 18 NGOs and other institutions providing care to homeless people in Marseille. The study took place from June 1 to July 31, 2020.

Individuals were eligible to participate in the study if they were aged  $\geq 18$  years and were employed as an HCW. In this study, HCWs were defined as individuals who worked in one of the 18 NGOs and other institutions providing care to homeless people in Marseille, including, but not limited to, attending physicians, nurses, coordinators, social workers and administrators. No sampling techniques were performed. All eligible HCWs were invited to participate in the quantitative section of the study.

The quantitative study included an online questionnaire that collected data on HCWs medical history of SARS-CoV-2 infection, acceptability of RSTs, results of RSTs and compliance with recommended protection measures. The finger-prick SARS-CoV-2 RST distributed to HCWs (Biosynex COVID-19 BSS) simultaneously measures the presence of immunoglobulins M (IgM) and G (IgG) and provides results within 10 min. A specialist in infectious diseases provided five sessions of online training to all participating HCWs about RSTs (self-testing and test validity). A nurse or physician supervised testing when HCWs felt they needed assistance. RSTs were provided free of charge.

The qualitative assessment was performed using face-to-face interviews. Participants were recruited from seven of the 18 participating NGOs and institutions. NGOs, institutions and participants were representative of all organisations and HCW stakeholders working in Marseille, and were also included in the quantitative part of the study. An anthropologist summarised and extracted meaningful discourse content and formulated and analysed relevant discourse themes.

## 3. Results

### 3.1. Quantitative findings

Of the 106 HCWs participating in the study (i.e. study sample), 102 had an RST (4 refusals). Sex ratio (M/F) was 0.45, age range was 20–65 years (median age: 39.6 years). The main results are summarised in [Table 1](#).

In total, 6.1% had a positive RST result ( $n = 6/99$ ). HCW acceptability of RSTs was mostly good, with only 4% ( $n = 4/101$ ) reporting concern. Just over one-third (36.7%,  $n = 40/98$ ) of participants were surprised by their RST result (positive or negative). Only one individual reported a previous positive RT-PCR result. Almost all participants (88.2%,  $n = 90/102$ ) who had previously had an RT-PCR test reported that they had shared their result with co-workers and family, and 93.9% ( $n = 98/99$ ) reported no fear of stigma if they were to receive a positive result. The majority of the participants perceived RSTs as similar or better (74.7%,  $n = 59/79$ ) in terms of validity to serology tests performed in medical laboratories. Two-thirds of respondents (71.6%,  $n = 73/102$ ) declared that they did not want to have their RST (present study) results checked using this gold-standard method. The majority of participants did not need the help of a nurse or doctor to perform the test (88.6%,  $n = 85/96$ ) ([Table 1](#)). A minority (20.6%,  $n = 21/102$ ) of the study population reported having previous RSTs for other pathogens.

With regards to prevention behaviours, most participants reported

**Table 1**

Sociodemographic, biological and prevention practice characteristics of study participants.

Characteristic	n (%) <sup>a</sup>	N <sup>b</sup>
<b>Sociodemographic characteristic</b>		
Gender		106
Male	33 (30.8)	
Female	73 (68.2)	
Median age [years (range)]	39.6 (20–65)	106
Type of work		106
social workers	46 (43.4)	
nurses or physicians	28 (26.4)	
administrative or logistic	32 (30.2)	
Time working in current healthcare structure (years [95% CI])	3.5 [2.8–4.2]	104
<b>Previous test(s) for SARS-CoV-2 and symptoms of COVID-19</b>		
Medical history of COVID-19 symptoms before RST?		106
Yes	28 (26.4)	
No	78 (73.6)	
Medical history of COVID-19 RT-PCR?		104
Yes	48 (46.2)	
No	56 (53.8)	
Did you agree to have an RST for the present study?		106
Yes	102 (96.2)	
No	4 (3.8)	
Who performed the RST?		96
Yourself	14 (14.6)	
Nurse or physician	11 (11.4)	
Work colleagues other than nurse or physician	71 (74.0)	
RST result		99
IgM and/or IgG positive	6 (6.0)	
IgM and/or IgG Negative	93 (94.0)	
<b>Prevention measures practiced</b>		
Wearing a mask, physical distancing and washing hands with hydroalcoholic gel at work		106
Always	38 (35.8)	
Mostly	61 (57.5)	
Sometimes	5 (4.7)	
Never	2 (1.9)	
Wearing a mask, physical distancing and washing hands with hydroalcoholic gel at home		106
Always	23 (21.7)	
Mostly	39 (36.8)	
Sometimes	27 (25.5)	
Never	17 (16.0)	

CI, confidence interval; RST, rapid serological test.

<sup>a</sup> Unless stated otherwise.

<sup>b</sup> Number of respondents for each question.

practicing adequate measures ([Table 1](#)). Nevertheless, 74.3% ( $n = 79/106$ ) reported feeling unsafe in terms of the risk of SARS-CoV-2 infection at work. More than half of the participants (64.8%,  $n = 68/105$ ) reported no change in their prevention behaviours, especially wearing a mask, after receiving the RST result. Of these individuals, all of those who received a positive test result said they intended to use masks with the same frequency as before the RST. The large majority (90.7%,  $n = 88/97$ ) of respondents reported that being informed about their SARS-CoV-2 serological status was an important element in controlling transmission.

More than half of the study participants (52%,  $n = 53/102$ ) declared that they would be willing to have another RST within one month, if necessary.

### 3.2. Qualitative findings

For the qualitative section of this study, we enrolled 21 professionals (9 nurses and physicians, 12 social workers and project coordinators) from seven of the 18 participating NGOs and institutions. In total, 15 participants were women, and ages ranged from 24 to 47 years (see [Supplementary table S1](#)). The following two key themes were identified from the discussions:

1. RST is a new tool and its validity is sometimes contested. Some respondents perceived that RSTs do not have enough scientific validity. One nurse doubted the validity of the test just because it was new. Some participants were also very sceptical about the scientific discourses and communication strategies surrounding COVID-19 transmission modalities and its prevalence.

*“This test has come out of nowhere and its efficiency hasn't been proven”.* Nurse, 40 years old, female, emergency shelter.

2. Competing risks. No fear of stigma was reported regarding a potential positive RST result. Some respondents with a great deal of professional experience in social and humanitarian work might have downplayed their own risk of infection because they were used to infection risks from other diseases and/or used to generally feeling unsafe at work.

*“I've never felt worried about the risk of being infected by COVID-19. As social workers in charge of homeless persons with mental disorders, we are used to being exposed to many diseases: Hepatitis B, HIV, with sometimes ... attacks with needles”.* Social worker, 30 years old, male, outreach mobile team for homeless persons with psychiatric disorders.

Some HCWs reported that access to RSTs and information about their serological status did not help them to diminish work-related stress. Indeed, for a minority of respondents, not being aware of their status was easier for them. Most HCWs reported that they preferred the risk of SARS-CoV-2 infection to the risk of being excluded or ‘not being where they should be’ as field workers whose mission is to protect and provide care to homeless patients. This problem-avoiding strategy seemed effective for these HCWs, as they could cope with the risk of being excluded from their workplace for health reasons.

*“I would prefer not to know my status because I work on the ground, with my colleagues, not in isolation at home”.* Peer worker, 30-year-old, male, prevention health project for homeless people in a slum.

Although a few respondents reported hesitation concerning the use of RSTs, the majority highlighted the importance of screening for SARS-CoV-2. A positive response towards the use of RSTs was dominant in team leaders and HCWs working in collective accommodation centres, where prevalence could be important.

#### 4. Discussion

Analyses provided mixed results on HCWs workplace risk factors and the risk of SARS-CoV-2 infection during the initial phase of the pandemic in Marseille, as well as data on RSTs and prevention measures. HCWs are at a greater risk of SARS-CoV-2 infection than the general population [5]. Furthermore, our study focused on field-based HCW caring for the homeless, a community where the risk of infection is particularly high [3,4]. Indeed, seroprevalence in HCWs who had an RST as part of our study (6.1%) was higher than in the general population in Marseille in June 2020 (3.6%) [6]. HCWs have had to deal with more difficult working conditions due to the COVID-19 crisis. In this health emergency context, our quantitative and qualitative findings suggest an ambivalent attitude by HCWs towards the risk of infection and their feeling of not being safe at work was counterbalanced by their strong determination to continue working in this high-risk environment.

Several studies on the COVID-19 pandemic have reported increased stress, anxiety and depression in HCWs facing complex situations in their work and home lives [7]. However, some authors also highlight that HCWs report a ‘sense of duty’ and the importance of properly performing their job [8]. Testing is widely recommended for HCWs who provide care to high-risk groups [9]. Widespread and simplified access to testing for HCWs should be implemented to identify asymptomatic individuals and prevent a transmission to co-workers and vulnerable populations. The RSTs performed in our study were easy to implement in the participating organisations providing care to the homeless because the majority of HCWs were willing to have the test and because it is relatively simple to perform. Nevertheless, training, support and information on RSTs and how to correctly perform these tests should be

provided to HCWs to reduce the risk reluctance/hesitancy and improper use.

Finally, RSTs could be an important tool for exposed HCWs. Indeed, managing exposure risk and promoting vaccination are essential tools in limiting the impact of SARS-CoV-2 infection and subsequent COVID-19 disease in this workforce [9]. It is the responsibility of HCWs to promote screening by disseminating the correct information. However, health strategies aimed at persuading HCWs to be screened and vaccinated are more likely to succeed if training is provided and current social values are considered.

The current study has limitations. First, participants in the quantitative component of the study responded through an online survey. This data collection choice was made because of the large and diverse number of NGOs and institutions in Marseille (France's second-largest city). Our study may also have underestimated the prevalence of SARS-CoV-2 infection. False-negative results arising from low antibody concentrations have been observed, especially in asymptomatic individuals and a long time after the initial infection [10].

Other comparative studies and large prospective studies are needed to confirm the benefits of free self-RST testing in HCWs in terms of public health.

#### 5. Conclusions

The quantitative findings reported a higher prevalence of SARS-CoV-2 antibodies following RST in HCWs than in the general population. Quantitative and qualitative data provided conflicting results on HCW acceptability of RSTs. This highlights that RSTs should be complemented with information on the advantages and limitations of this testing strategy.

RSTs are relatively cheap and easy to use, and could help reduce SARS-CoV-2 transmission as well as guide policy makers when developing prevention measures for this key healthcare population.

#### Authors' contributions

EM and AT designed the study. EM and MM distributed and trained participants in performing the RST. EM performed the quantitative analyses. ON performed the qualitative analyses. EM and ON wrote the first draft of the manuscript. All authors read and approved the final version of the manuscript.

#### Ethical approval

This study was approved by ethical committee on May 28, 2020 (number 44-20) and informed consent was obtained from all participants.

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#### 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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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhip.2021.100154>.

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