Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Short report

Utility of nasopharyngeal swabs in series before hospitalization during SARS-CoV-2 outbreak

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Sir,

Since the SARS-CoV-2 outbreak, Emergency Departments (EDs) have been through continuous reorganization in order to deal with both COVID-19 and ordinary patients. Nevertheless, previous evidence reports hospitals to be an important source of contagion during epidemic [1,2], making it essential to control the infection risk in healthcare settings. For this reason, and given the reported low sensitivity (63%) of a single test [3], several hospitals decided to require two negative nasopharyngeal swabs before admitting patients to non-COVID wards as has been reported in previous studies regarding MERS-CoV and SARS-CoV-2 [4]. However, such a strategy involves keeping patients in an isolated area awaiting admission, thus increasing boarding and overcrowding. The aim of our study was to analyse the diagnostic yield of a second swab in patients with or without symptoms of COVID-19.

We performed a cross-sectional study enrolling all adult patients (i.e. ≥18 years) admitted to the ED of Ospedale Maggiore Policlinico of Milan from March 1 to April 15, 2020 and then hospitalized. Ethical approval for this study was obtained from Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico ethics committee. As suggested by international guidelines [5,6], patients with COVID-19-typical symptoms (fever, dyspnea, cough, sore throat, loss of taste and smell) or close contact with laboratory-confirmed cases were addressed to the COVID-suspected path. Patients without these features were addressed to the non-COVID path.

Epidemiological, clinical and laboratory characteristics of the two groups were obtained from electronic medical records.

Nasopharyngeal swab specimens were collected following a standardized procedure [7] and RT-PCR was performed on the specimen to detect SARS-CoV-2 RNA. The specimens were processed using GeneFinder COVID-19 Plus RealAmp Kit.

In case of a positive test, we admitted patients to a COVID ward; otherwise, we performed a second swab after 24 h.

We evaluated the diagnostic yield of the second swab as the proportion of patients with a second positive test on the total number of patients that underwent the second swab and calculated the number needed to diagnose as the ratio between the number of the second swabs performed and the positive ones.

We expressed data as proportions and 95% confidence intervals (CIs) and performed all analyses with Microsoft Excel (Microsoft Corporation, Redmond, WA, USA).

During the study period, 2721 patients presented to the ED and 835 met the inclusion criteria. Among these, we admitted 630 patients to the COVID-suspected path and 205 to the non-COVID path.

In the non-COVID population, we performed a swab in 122 (60%) patients and six (5%; 95% CI: 1%, 9%) patients were

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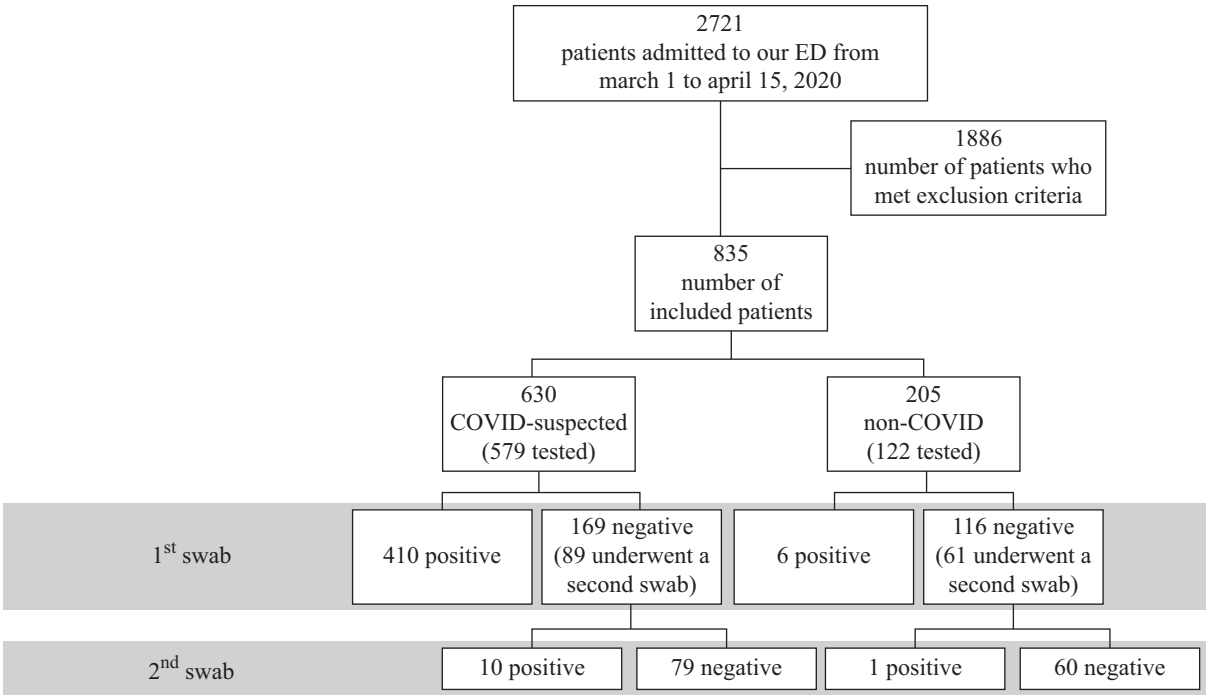

Figure 1. Patients selected for the study and the results of nasopharyngeal swabs.

positive. Among the 116 negative patients, 61 underwent a second swab within 24 h and 60 patients (98%; 95% CI: 95%, 100%) were negative, while one (2%; 95% CI: 0%, 5%) was positive, so that we had to perform 50 tests to detect one positive patient.

In the COVID-suspected population, we tested 579 patients (92%) for SARS-CoV-2 infection: 410 (71%; 95% CI: 67%, 74%) were positive, while 169 (29%; 95% CI: 26%, 33%) were negative. We performed a second swab in 24 h on 89 negative patients among whom 79 patients (89%; 95% CI: 82%, 95%) tested negative and 10 (11%; 95% CI: 5%, 18%) tested positive. Therefore, the number of tests needed to detect one positive patient was nine. All these data are graphically reported in Figure 1.

Our results show that when using swabs in series in patients with low probability of SARS-CoV-2 infection, the second swab has a low diagnostic yield (2%), while when using the second nasal swab as a diagnostic test in patients with a high probability of infection, the diagnostic yield is higher (11%) and may justify performing a second swab in clinical practice.

Moreover, considering the overall low sensitivity of the nasopharyngeal swab [6], performing a second swab test does not completely remove the risk of hospitalizing infected patients in non-COVID wards while it increases boarding and overcrowding. In addition, testing patients with two swabs results is an increased financial burden and could lead to difficulties in providing swabs in a context of limited supply of COVID-19 tests.

Therefore, we believe that healthcare settings can not rely on the swab test to rule out SARS-CoV-2 infection. Instead, given the high risk of in-hospital contagion, risk control strategies based on personal protective equipment use and preventive isolation for every patient — even when tested negative — is strongly recommended.

Author contributions

All authors contributed to the design of the study, data collection, analysis and interpretation, revised the article critically and approved the final version.

Conflict of interest statement

None declared.

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