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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Letter to the editor

How to increase the SARS-CoV-2 detection rate through the nasopharyngeal swab?

Dear Editor,

The 2019 novel coronavirus disease (SARS-CoV-2) is an evolving pandemic. Since its first appearance in Wuhan, China, in December 2019, an increasing number of cases are being diagnosed worldwide. The laboratory tests currently employed for the identification of SARS-CoV-2 usually detect the viral RNA through nucleic acid amplification, generally using the polymerase chain reaction (PCR), and the nasopharyngeal swab is the most commonly used method to obtain respiratory samples [1].

Several alternatives methods to obtain both upper and lower respiratory samplings have been described, and the most sensitive way to diagnose a coronavirus infection is to collect both upper and lower airway samples [1]. A retrospective study conducted in Wuhan showed a poor detection rate of nasal and pharyngeal swabs (38.25%), while collected sputum exhibited a 49.12% positive rate [2]. In another study conducted on 205 patients, nasal swabs obtained a positive rate of 63% (n = 8), significantly lower than bronchoalveolar lavage (BAL, 93%, n = 15) or sputum (72%, n = 104) [3]. However, the collection of lower respiratory tract fluids is associated with invasive procedures (e.g. BAL) with higher costs, and greater risk for the physician. These factor have limited the role of these invasive procedures in case of asymptomatic or mildly symptomatic patients. BAL is unreasonable as a screening tool, and it is indeed performed only if a false negative result from the nasopharyngeal swab is suspected [4].

The reasons behind the high rate of false negative results obtained from the nasopharyngeal swab is unknown at this time. Possible causes include collection of inappropriate or inadequate material, improper specimen transportation, low viral load in asymptomatic patients, and lab errors. In particular, it was argued that the low detection rate of the nasopharyngeal swab could be directly dependent on the wrong execution of the sampling. Since in the posterior wall of the nasopharynx we found the highest concentration of lymphocytes possibly phagocyting infected cells it seems to be extremely important to properly collect nasopharyngeal samples at the posterior nasopharyngeal tonsil region in order to increase the virus detection rate. Since the sampling is not done under direct vision, it was suggested that only ENT specialists have the adequate anatomical knowledge to properly perform the nasopharyngeal swab. In fact, some other factors should be considered during the test. Nasal septal deformities (involving up to 90% in the adult population [5]), nasal obstruction from nasal polyposis, or inferior turbinates hypertrophy can prevent from reaching the rhinopharynx. In these cases, the possibility to perform the swab under direct endoscopic vision could ensure the correct execution of the test.

Improve nasopharyngeal swab detection rate

Several papers and videos have been recently published in order to better explain the proper method to perform a nasopharyngeal swab [6], while no studies were able to clarify if the high false negative rate could be determined by an incorrect sampling. In the common clinical practice, dedicated nurses are usually involved in performing nasopharyngeal swabs due to easily organization, and reduced costs. A simple study design can indeed compare nurses usually involved in sample collection, and ENT specialists under endoscopic vision, in performing the nasopharyngeal swab in the same patients cohort. A higher detection rate in the second group will demonstrate how the collection of inappropriate or inadequate material represent a leading cause of the high false negative rate. Although it seems clear that further evidences are needed to ameliorate nasopharyngeal swab sensitivity, several issue are encountered during studies design. Health-care providers involved in Covid-19 assistance are directly subjected to infective risks, particularly if invasive procedures are performed. In particular, routine endoscopic examinations including nasal endoscopy are considered aerosol generating procedures with high risk for transmission [7]. Other than the ethical issues related to the risk of contagion, other logistical problems are inevitably encountered. A tailored room with endoscopic technology should be prepared in a dedicated environment inside the area at risk, with the consequent costs for instruments, and dedicated staff.

Future implications

The possibility to use a high sensitivity test will be particularly crucial in the short-term period. Many countries particularly affected by the pandemic (e.g. UK, Italy) will gradually re-start normal daily activities in the following weeks. Although several precautions will be taken, the risk of relapse should not be underestimated.

In this context, the CDC currently recommends self-collected nasal swabs in order to reduce costs, and to increase access to testing [8]. While there are limited data on the self-administrated tests sensitivity, the risk of a potentially higher false negative rate is not to be neglected. From this perspective, an important assumption should be made for the clinical context. In an effort to reduce the risk of transmission, many professional societies have recommended screening for COVID-19 prior to patients hospitalization, as emerging data suggests that patients can be asymptomatic carriers [9]. Moreover, a health-care providers screening is still encouraged in order to limit the infection widespread into the hospitals when the elective activity will start again. In this setting, a low sensitivity test can be dangerous, and a large number of undiagnosed cases could in fact lead to a second wave of infections. The partial reopening of activities has indeed drawn attention to SARS-CoV-2 tests such as the serologic testing. Although promising results of studies assessing the kinetics of antibody formation after SARS-CoV-2 infection, the WHO does not currently recommend utilizing serologic testing to guide decision making [10].

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Conclusions

In conclusion, further studies are recommended in order to improve the SARS-CoV-2 detection rate through the nasopharyngeal swab. Important implications are particularly evident in the expectation of activities re-opening, particularly for the health-care setting where the suspension of the elective activity could not be further delayed.

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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