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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Is oropharyngeal sampling a reliable test to detect SARS-CoV-2?

We would like to congratulate Nicole Tsang and colleagues on their clinically relevant systematic review and meta-analysis of the diagnostic performance of different sampling methods to detect SARS-CoV-2 by RT-PCR.[1] The authors concluded that, compared with a nasopharyngeal swab, a pooled nasal and oropharyngeal swab offered the best alternative sampling approach to diagnose SARS-CoV-2 infection, followed by saliva and nasal swabs. Oropharyngeal swabs were not recommended for diagnosis because of low sensitivity and positive predictive value.

In the meta-analysis, the gold standard was nasopharyngeal swab, such that any other sample that gave a positive SARS-CoV-2 RT-PCR test (eg, saliva, nasal swab, or oropharyngeal swab) was categorised as a false positive if the nasopharyngeal sample was negative for the same individual. We are concerned that this approach might have introduced bias. To illustrate, we used data from a study by Xiong Wang and colleagues,[2] which was included in Tsang and colleagues' review. In this study,[2] 192 individuals were concomitantly tested using a nasopharyngeal and an oropharyngeal swab, of whom 19 (10%) tested positive by one or both tests. Seven (37%) of 19 patients had tests that were concordant and 12 (63%) were discordant; seven of 12 were positive by nasopharyngeal swab and five were positive by oropharyngeal swab. In their meta-analysis, Tsang and colleagues calculated the sensitivity of the oropharyngeal swab to be 50% (seven of 14) and the specificity to be 93% (178 of 192).[1] However, if the reference had been any positive sample from the upper airway, the sensitivity of a nasopharyngeal swab would have been reduced from 100% to 74%, and the sensitivity of an oropharyngeal swab would have increased from 50% to 63%—ie, the difference would have been 11 percentage points and not the 50 percentage points reported by Tsang and colleagues. Nevertheless, a nasopharyngeal swab would remain numerically more sensitive than an oropharyngeal swab.[1]

Nasopharyngeal swabbing is a challenging procedure and improper sample collection is known to contribute to false-negative results.[3] We think that the reference for assessing different sampling methods must be a sample method that tests positive in any upper airway sample, because RT-PCR has a very high specificity to detect SARS-CoV-2. This view is also that of WHO, which recommends combining nasopharyngeal and oropharyngeal swabs to improve diagnostic accuracy.[4] Further research is warranted to improve the evidence base on, and guide recommendations for, the optimal sampling technique that yields the highest diagnostic accuracy among individuals presenting in ambulatory care.[5]

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Authors' reply

We thank Tobias Todsen and colleagues for their comments on our recent systematic review and meta-analysis comparing the diagnostic performance of different sampling methods to detect SARS-CoV-2 by RT-PCR.[1] Based on the findings of one included study,[2] they questioned whether any positive sample from the upper airway would be a better gold standard than the traditional nasopharyngeal swab. This method corresponds with a practice that has also been used previously by a small number of studies.[3,4] Here, we repeat the random-effects meta-analysis, including all 23 studies and using any positive respiratory sample as the reference gold standard. We calculated the sensitivity and negative predictive value (NPV) for each sampling approach (table).

The updated results are consistent with our previous conclusion, with pooled nasal and throat swabs offering the best diagnostic performance with sensitivity maintained at 97%, followed by nasopharyngeal swab (sensitivity changed from 100% to 94%), saliva (85% to 87%), and nasal swabs (86% to 87%). Throat swab (68% to 75%) still ranked as the least sensitive approach, with a 22% lower sensitivity than pooled nasal and throat swab (table). Similar to our previous analysis,[1] NPVs were comparable and high (range 95–99%) for all sampling approaches.

Although the sensitivity estimate might numerically vary, our results show that the ranking of diagnostic