

## Letter to the Editor

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# Usability of non-medicinal swabs for SARS-CoV-2 detection to circumvent supply shortages

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To the Editor,

We follow with interest the discussion on molecular diagnostics in the COVID-19 pandemic. Accurate diagnostics, be it by rt-PCR, antigen detection or serology, is a cornerstone in understanding the COVID-19 pandemic and in containing local outbreaks and clusters [1]. Despite ongoing discussion concerning too high sensitivity (i.e. detecting low levels of viral RNA, which are not relevant in terms of infection control), rt-PCR was rated as reference method for SARS-CoV-2 diagnostics [2]. Meanwhile, laboratories in many European countries further increased test capacities. To cope with the high number of tests under limited availability of test kits, pooling of swabs may be an alternative under certain circumstances [1].

During the first wave of the COVID-19 pandemic in Switzerland, considerable supply shortfalls occurred for essentially all diagnostic material used for SARS-CoV-2 viral diagnostics procedures, including swabs. We thus decided to test the possibility of using cotton-based swabs to alleviate potential future supply shortages. For this procedure, we identified four commercially available, non-medical cotton swabs (Table 1) and tested them on a volunteer with documented low viral load (cycle threshold (Ct) value 38 on testing with a commercial flocked swab in broth – Copan eSwab® Minitip 80481CE, Brescia, Italy) in

both, the nasopharyngeal (NP) as well as the oropharyngeal (OP) approach.

All NP swabs and OP swabbing was performed according to standard operating procedure by one experienced and trained nurse within a 2-h time interval on the same day. Sequence of procedures was alternating between nasopharyngeal and oropharyngeal swabbing.

For all samples obtained, rt-PCR protocols for detection of SARS-CoV-2 were performed identically and according to standard operating procedures, as suggested by the manufacturer (RealStar® SARS-CoV-2 RT-PCR, Altona Diagnostics, Hamburg, Germany).

In addition to the use of the commercial flocked eSwab® (as a positive control), a cotton swab with a wooden applicator (although known to be inhibitory to the

**Table 1:** rt-PCR results of the reference eSwab® Minitip (Copan, Brescia IT), the wooden BD Polyester Fiber-tipped Applicator Swab (REF 220690, Becton Dickinson, Sparks, MA, USA) and of commercially available, non-medical cotton swabs.

	rt-PCR result, after nasopharyngeal swipe (Ct)	rt-PCR result after oropharyngeal swipe (Ct)
Flocked swab	Positive (37.76)	Positive (38.09)
BD applicator swab	Negative	Negative
(1) “Flawa Premium”	Negative	Negative
(2) “wel!”	Positive (36.74)	Negative
(3) “Bio Migros”	Positive (37.21)	Negative
(4) “Primella”	Positive (37.30)	Negative

Swab 1: “Flawa Premium” cotton buds, FLAWA Flawil, SG, Switzerland, Swab 2: “wel!” cotton swabs (own brand of Coop Genossenschaft, Basel, Switzerland), Swab 3: “Bio Migros” cotton swabs (own brand of Migros-Genossenschafts-Bund, Zurich, Switzerland), Swab 4: “Primella” cotton swabs, Migros-Genossenschafts-Bund, Zurich, Switzerland. The yield for detecting the virus, as indicated by the Ct, is comparable between the flocked swab and the non-medicinal cotton swabs in the nasopharyngeal swabbing, except in Swab 1, while no signal was obtained with either swab when applying oropharyngeal swabbing.

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PCR reaction) was included for completion of the spectrum of commercially available swabs (Table 1).

The comparison of proportions (75% positive results after NP swipe vs. 0% positive results after OP swipe) indicates relevant differences in the results between both procedures on the cotton swabs.

From these results, three conclusions can be drawn:

- (1) Whenever possible, optimized conditions (e.g. flocked swabs) should be used to obtain swab specimens for SARS-CoV-2 virus diagnostics.
- (2) If medical swabs are unavailable, certain cotton-based swabs can be utilized for SARS-CoV-2 virus diagnostics in nasopharyngeal swabs; there is a need, however, for the respective laboratory to properly evaluate products. Wooden sticks should be avoided.
- (3) In situations, in which a lower viral load might be present (here: Ct>35), a nasopharyngeal swab specimen is to be favored over an oropharyngeal swab specimen as sensitivity might be considerably higher.

With the upcoming fall and winter in Europe, the start of flu-like and influenza season, further increases in test volumes are anticipated. As of now, the supply of commercial swabs is still not covering the demand, and further

worsening is likely. We have shown here, that non-medical swabs may provide an alternative of coping with supply shortages. However, given the fact that in certain stages of COVID-19 virus burden can be low, we suggest that all swabs, that are to be used for SARS-CoV-2 virus diagnostics, should be obtained via the nasopharyngeal approach (nasal, mid-turbinate or nasopharyngeal swab).

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